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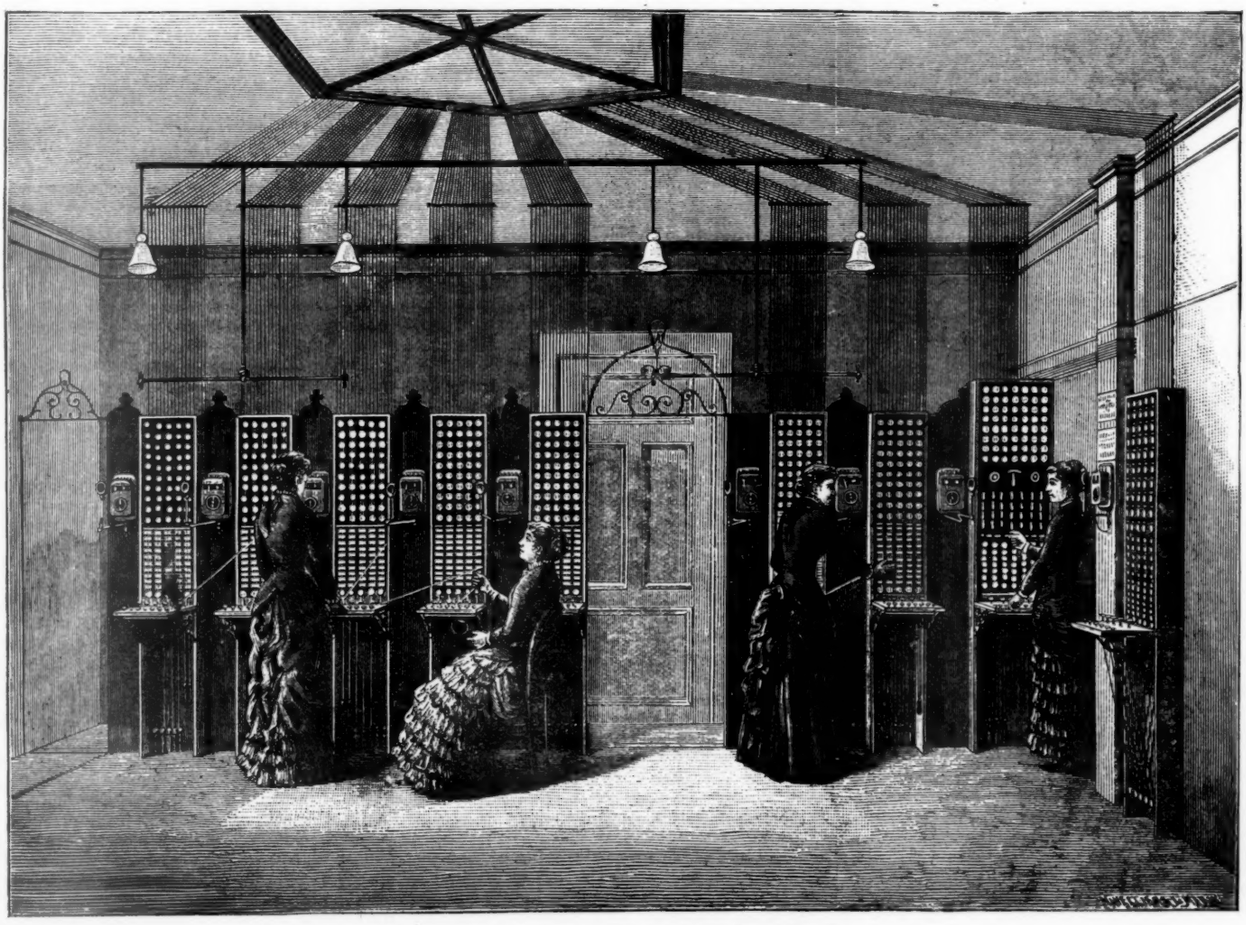
Swiss Telephone Systems.

In the Telephonic Review, which we published in the number of July 14th last of this paper, we have sketched a few of the particulars relating to the state of telephony in Switzerland, and we even went so far as entering into some details on the organization of the lines which are used in that kind of telegraphy. To-day we are going to complete our statement by examining, according to Mr. Rothen's report, the organization of the central offices.



TELEPHONE CENTRAL OFFICE, AS USED IN SWITZERLAND.

As it has been seen in the article just referred to, the telephone lines in Switzerland are formed of aerial (elevated) wires, which pass over the houses, supported every hundred yards in a middle way by iron horses. Such horses are placed astride on the apex of the pointed roofs, and generally provided with six horizontal cross-bars of iron, upon which are screwed, from six to eight in number, small insulators, in porcelain, with a single bell. By this system the iron horses simply rest on the roof without any fastening, that permits to remove them in the most easy manner. Such distance of 100 yards is not fixed by any regulations, and, in fact, it often happens to be reduced to thirty yards or prolonged to 300 yards, according to the possibility of selecting convenient resting points.

These horses are made of buttressed corner irons varying in size from 2 to 2½ inches in width and from four to five-sixteenths of an inch thick, and the cross-bars for the insulators are made of T-irons, having 1¼ to 2 inches in width, by two three to five-sixteenths of an inch thick. Their weight may be somewhat over 1,000 pounds. The two feet of the two upright bars are consolidated together by means of small cross-ties. The horse, moreover, may be placed in a parallel line, normally or obliquely, with the ridge of the roof according to the direction of the line wires; that is a matter of disposition in the placing of the cross-bars on the base irons straddled on the ridge of the roof, and the number of wires which they bear varies from 48 to 60. In order to avoid the breakage of the tiles and slates by these iron horses, pads, made of tarred cloth and filled up with mineral wool, are placed between their feet and the roof; and further, they are maintained in a vertical position by wire shrouds fastened on the rafters of the roof. The space between the wires on the horses varies, in proportion of the span length, from about 12 to 30 inches, which latter distance corresponds to a span of 200 yards.

The size of the horse consequently varies not only according to the number of wires they bear, but also in proportion to the length of the span from one horse to another, and they must always be placed squarely with the direction of the wires in the longer span. The wire adopted is, as has been seen, galvanized cast steel wire, having a diameter of one-sixteenth of an inch; it can bear a traction of 800 to 900 pounds, capable of being strongly twisted, and does not stretch more than two per cent. at the maximum for the highest tractions, but it offers a resistance of 60 to 65 ohms per kilometer (about three-fifths mile).

The setting up of that wire is delicate, because it should not be dented, and to unroll the same, reels of a special kind must be used. Weldings are made with very soft iron wire, about $\frac{1}{16}$ of an inch in diameter, and must be placed within 10 yards of the points of support. Finally, the maximum tension to be given to the wires must never be over 60 kilogrammes (about 125 pounds), on account of the rigor of the climate.

The insulators are made of small porcelain cylinders, thinned in the middle, and presenting at their lower part a rather shallow cavity, at the bottom of which an excavation is made, provided with a screw thread, in which the support of the apparatus is fastened.

By means of repeated divisions in the arteries of the telephonic networks, we arrive at having lines with a limited number of wires, and then the points of support become more simple; instead of having two upright bars there is only one, which is fastened on the beams and the wall gables. When horses fail, their place is supplied with posts like those of the telegraphic lines, but in such cases the insulators become different and take the shape of those which are used on the telegraphic lines, and where the distance becomes considerable, the steel wire is replaced with

iron wire of the same kind used on telegraphic networks.

"The last section of each telephonic wire," says Mr. Rothen, "is the one which ends at the place of the subscriber. For the installation of this last section they proceed in the following manner: They place the first insulator as high as possible on one of the faces of the building, and then go down in a vertical line to the second insulator, set up near the point at which they desire to penetrate into the house. Where it is possible to approach the house from behind or through a courtyard, such a way should have the preference, because the less apparent those installations are, the better is the effect. Often it happens that the rigidity of the steel wire would not permit to bend it around the sundry projections of the house fronts. Then they use annealed wire, $\frac{3}{10}$ of an inch, of the same kind which is used for ties of line wires to the insulators. With the last insulator placed on the house of the subscriber ends the properly called line, and all that which continues the communication between this point and the earthen plate forms a part of the interior installation.

"The point from which all the arteries start is called *chevalet central* (central horse.) Its form and size vary according to the extent of the net-work, the shape of the roof, and the general construction of the building wherein the central station is established. Sometimes the central horse (*chevalet*) branches into several horses which are distinguished from other horses only in regard to the consolidation that must be stronger yet, because the traction is unilateral. But in most of the cases the central horse is formed around a turret or pavilion built for that purpose; it surrounds such pavilion on all its faces at a distance from 8 to 12 inches. At each angle arise two upright bars fixed to the corner beams by strong bolts, and the upright bars carry several series of crossbars, so that horses turned in all different directions may be obtained, which altogether form the unique carcasse of the *chevalet central* (central horse). We will add that the minimum distance between the wires fixed, as it has been seen, at 12 inches, does not hold good for these kind of horses and can be reduced to 4 inches.

Mr. Rothen pretends that telephonic wires are rather inoffensive, in regard to the facility they might afford to lightning in penetrating into houses. He says that the cases of thunder-striking happens in open country and not in towns or cities, and that consequently lightning rods could be dispensed with. But, as the public is easily alarmed, the horses placed on houses provided with lightning rods, have metallic connections with the conductors of such lightning rods, and at exposed places have communication with the ground. Morever, the telephonic apparatuses are themselves provided with lightning conductors.

On another side, in order to avoid the noise proceeding from the vibrations of the supports of the telephonic lines under the influence of the longitudinal vibrations of the line wires, they have established, in the neighborhood the insulators most exposed to such vibrations, some kind of deadening apparatuses, the disposition of which has been rather varied and is yet under experimentation, and which seem to have produced satisfactory results. Those means besides have long been in use on the telegraphic lines.

Central Stations.—At the central stations the ærial wires which meet on the central horse are there put in communication with lightning conductors of a special form, combined by Mr. Rothen.

They are lightning conductors with plates, after the model used in Germany, but disposed in such a manner that they may be applied to several lines. For that purpose the superior plate of the ordinary lightning conductors with plates, has been replaced by a series of narrow metallic plates strongly bolted upon insulating plates. Each one of such plates is four inches long, one-half inch wide, and one-eighth inch thick. Their internal surface is furrowed with grooves, so as to form a continuous series of ribs with sharp edges; those ribs are also on the superior face of the under plate, which is in communication with the ground, but the two series of ribs cross each other so as to give a great number of points nearly touching each other, that facilitates the passage of the sparks to the ground plate. The distance of the sundry small plates forming such ground plates is regulated by means of screw-nuts which, at the same time, form the connection of the lightning conductors with the telephonic lines. Most often these lightning conductors are fixed to the ceiling of the turrets and over the windows, or else when inside of the pavilions, the *conduit* (shaft) which brings the wires into the central station is large enough, they placed them in that conduit. From the lightning conductors the wires communicate with the subscribers' commutators by copper wires $\frac{1}{32}$ inch in diameter, insulated by a double layer of paraffined cotton thread, and stretched parallelly along side of the other. A chimney flue brings them from the turret into the room where those commutators are (Fig. 3) by layers of fifty wires, which diverge along the ceiling of that room above the diverse commutators, and the latter correspond to fifty lines and fifty numbers. When the conduit opens in the middle of room, a star is formed by them which, as it may be seen by Fig. 3, permits to distinguish each wire with facility, as in the rosaces of the French offices.

The system of commutators adopted in Switzerland is of Western Electric Company's manufacture, which we described in our work on telephones, and which was exposed at the exhibition of 1881. That system is composed of a large vertical table, on the upper part of which is the annunciator, with the fifty numbered plates for the calls, and below the fifty commutators or *jack-knives* to establish the communication among the subscribers. Lastly, underneath the foregoing commutators, disposed in ten horizontal rows, and five vertical rows, as well as the corresponding numbers, we find a private row of indicators intended for the direct relations exchanged between the office employes and the two correspondents.—*La Lumière Electrique.*

Tower Electric Lighting.

An English exchange remarks that the system of town lighting by means of electric lamps mounted upon high masts or towers, which has found an extensive application in America, is now being tried in the Horticultural Gardens, South Kensington. A wooden framework thirty feet high has been erected, and upon this an iron lattice pole eighty feet in length is fixed, making a total elevation of about 110 feet. At the top of the tower there are suspended six Hochhausen arc lamps, fed from a generator in the electric light department of the Fisheries Exhibition, and each of 6,000 candle-power (nominal). During the dark, clear nights which have prevailed of late the lights have been seen to great advantage, and it has been easy to form an accurate judgment of their maximum effect. From the foot of the tower to the western quadrant is a distance of 500 feet, and at that point it is possible to read a book printed in type of the size in which these notes appear, when the light falls directly upon it. This corresponds to the illumination afforded by a street lamp at a distance of about fifty feet. The gardens near the base of the tower are brilliantly lighted, and any kind of outdoor occupation might be carried on in them without difficulty. At about 300 feet distance the shadows begin to be distinctly noticeable, and great care is needed in passing from the patches of light into those of darkness, because the gloom is for the moment too dense to be penetrated by the eye. While the grounds are put to their present pleasant uses, and are filled by a crowd who are enjoying the cool evening air and the music of the bands, this is rather an advantage than otherwise, and adds a moonlight effect to the general charm of this, the most agreeable entertainment which has been provided in London for many years. But if the space were devoted to business or rapid circulation, it is evident that a much more useful result might be gained by distributing the lights more equally over the area. Unfortunately, they are only half the height of those commonly used in America, and thus the shadows are longer and more obtrusive, but still they are higher than it would be practicable to keep them in this climate during nine months of the year. The experience of the city lighting showed that even eighty feet was too great an elevation during the Winter, and that little more than half that distance there was a loss of brilliancy.—*Chicago Journal of Commerce.*

Improved Lights and Dynamos.

The Vienna Electrical Exhibition is, as might have been supposed from the admirable arrangements made by its managers, doing effective work. In electric lighting alone there are now being exhibited some very valuable improvements. A German company has shown that it is possible to turn on or off any number of incandescent lamps in one circuit without any special and complicated arrangements for regulation of the current. This, we understand, is effected by means of compound dynamos. An electrical adjunct is fastened to the wall of a room in which the lights are established, and by operating this, one or more lamps can be short-circuited without difficulty.

The makers of those incandescent lamps, which up to the present time have been in use, have considered it necessary to introduce a greater or lesser resistance into the circuit in order to secure this very desirable result.

In all the dispatches we have seen, the steadiness and constancy of the German dynamos, notably those of Ganz, Schuckert and Schwerd, have been highly commended.

The importance of steadiness in the generating machine cannot be overestimated. We have seen how most of the arc lamps tremble and sputter, now almost doubling the required intensity, and again almost sinking away in the gloom of night.

An American company exhibits an incandescent lamp which, if the description we have seen may be relied upon, is likely in the near future to be exceedingly valuable for the lighting of streets and large areas. This lamp is of sixty-five candles power, or about four times the power of the ordinary incandescent lamp, and instead of having a very fine carbon filament with a very small illuminating surface, like the latter, it has a hollow, semi-circular carbon cylinder, which is quite elastic and has comparatively a large illuminating surface.

A report says of this lamp:

"With an electro-motive force of twenty-three volts, and a current of seven amperes, it has an illuminating power of sixty-five candles; it stands midway between an incandescent and an arc lamp."

From this it would seem that the new incandescent street lamp possesses what must be looked upon as a very desirable quality in an incandescent light, viz: the requirement of only a low electro-motive force, for as we have frequently had cause to regret, the higher we make the electro-motive force, the more rapid will the work of disintegration go on in the carbon filament, and consequently the shorter will be the life of the lamp

Another advantage might be prophesied for this lamp. The fact that it requires only a low electro-motive force makes it possible not only to place a larger number of lamps in series, but also to feed the lamps from more distant stations than has been attempted or could well be done with those systems now in use.

Again, we think it an advantage in street lighting—not in house lighting—to show a greater luminosity than that of the ordinary incandescent lamp, which is that of sixteen candles, or equal to a five-foot gas burner. For though there will be fewer lamps in the street, an equal, indeed greater lighting power can be had in the same district at a considerable saving of expense in installation and economy in transmission of electrical energy.

If all the statements which we have seen regarding this lamp are true, it is an admirable mechanism and should be exceedingly economical in the use of the current. But those who have in any way had to do with electrical appliances of a novel kind, have for the most part become skeptical; they have seen that for which much had been promised do little in actual practice toward fulfilment, and that which came up to the expectations of its originators, so far as appearances go, prove only valuable as an agent through which good money could be decoyed after bad.

Therefore, it is, we say, we shall believe all that is said about this new American lamp when we have seen it, and had an opportunity to apply to its mechanism a few practical tests.—*Exchange.*

The Electric Light for Mills.

The rapidity with which the electric light is being accepted as a substitute for illumination by gas and other substances, indicates very clearly the positive nature of the proofs of its superiority. There can no longer be any doubt that in places where gas lights are used in considerable numbers, money can be saved by replacing them with a good system of electric lights. There are few textile mills, for example, which would not obtain direct pecuniary advantage by introducing electricity for purposes of illumination. It is alleged, no doubt correctly, that if gas be used to run a gas engine, and that engine be employed in generating electricity for the lights, the amount of light obtained from the latter will be ten times greater than that afforded by using the gas for lighting purposes.

But there are other advantages of equal importance accruing from the adoption of the electric light. The latter is much safer than gas. No explosive substances are given off, and there is no need to have about the mill the friction matches which are well known to be a frequent cause of fires. There are no gas-pipes running about the mill and exposed to risk of leakage. Nothing is required but a system of wires which can be placed out of the reach of the operatives. Gas vitiates the air if it escapes without burning, and also when it is burning, and it also heats the air. The temperature of a spinning-room where there are many gas-burners, will be sensibly raised within half an hour after the gas is lighted.

Of the superior illuminating power of electricity, no proof is needed. Weavers and spinners can see better with it, and of course they can do their work better. Where night-work is frequently necessary, this is a consideration of very great importance. The light, also, is not a yellow, but a white light. It is more nearly like sunlight than any other artificial light, and it therefore shows colors truly. Where there is electric lighting, the matching of shades and the distinction of greens and blues is just as easy as if there were daylight in the mill.

It is, we think, a mistake to suppose that the brightness of the electric light makes it more hurtful to the eyes than gaslight. Precisely a similar objection might be made to sunlight. An electric light in a mill is not to be looked *at;* its purpose is to supply light in which persons may look at other objects. It enables a workman to see his work distinctly. The human eye sustains greater injury by straining to see objects in an imperfect and insufficient light, than in any other ordinary manner. A dull gaslight put over a workman's head, will hurt his eyes far more than a bright light thrown upon the machine at which he is laboring. Moreover, the electric light is commonly enshrouded with ground-glass globes, which soften the intensity of the flame and diffuse it. This also has the effect to destroy the strongly-defined shadows which have been regarded by some as an objection to electric illumination.

It is an ascertained fact that the movement among the larger mill-owners for the introduction of the electric light is fast becoming general, and as the advantages of the system become better understood, as a result of practical observation, no doubt it will find its way into all industrial establishments of

any considerable dimensions, where work is done after dark. The gas companies, we observe, are fighting hard against this tendency, but they wage an unequal battle. The supremacy of the electric light seems to be inevitable, and every improvement made in it by various inventors, only hastens the time when it will win a final victory over gas.—*Textile Record.*

Submarine Mines.

During the American war submarine mines did great service as coast and harbor defences, and since that time they have been made the subject of considerable study by military and naval men of all nations. At the time of the Franco-German war, the Germans kept the French fleet away from their ports chiefly by this means of defence, and there can be no doubt that their importance for harbor protection can hardly be over-estimated. The Americans with their great extent of sea-coast, studded with important and flourishing towns, and their small navy, have naturally made submarine mines and torpedoes a special study. Indeed, we have before us a recent report on the subject made by Lieut. Col. Henry L. Abbott, of the U. S. Corps of Engineers, which deals with the experiments and investigations made to develop a system of submarine mines for defending the harbors of the United States. This report contains details of a number of different experiments, valuable formulæ, descriptions of electrical apparatus for firing mines, and other information highly interesting to military and ever, ordinary readers. We propose, therefore, to extract from this report such information concerning the electrical apparatus therein described as we think will prove useful and interesting to our readers. We shall deal first with that class of firing apparatus described under the heading

MAGNETO-ELECTRIC APPARATUS.

Magneto-electricity—*i. e.*, electricity generated by magnetism, has of late years received much attention ; and so great improvements have been introduced in the apparatus that, for certain classes of practical applications, it bids fair to supersede the voltaic cell. Through its agency mechanical energy may be transformed into electricity of almost any desired potential and quantity.

The fundamental principle upon which this mode of generating electricity depends is identical with voltaic induction. Indeed, according to the accepted theory, the phenomenon of magnetism is due to a series of electrical currents, circulating, around the molecules in a common direction, and the resultant of the effects of such a system is equivalent to that of a single current circulating round the exterior of the magnet. Facing the north-seeking pole, the direction of this resultant current is contrary to that of the hands of the watch ; facing the south-seeking pole it accords with their direction.

Adopting this theory, let the north-seeking pole of a magnet be inserted by successive movements into a continuous ring of wire. According to the laws of voltaic induction an instantaneous current of electricity will be induced in the ring at every motion. their direction when looked at from the side in which the magnet is inserted being the reverse of that of the hands of a watch. Withdrawing the magnet in the same manner instantaneous currents will be excited in the same direction as that of the hands of a watch.

If the south-seeking pole be approached to or withdrawn from the ring, similar currents, but reversed in direction, will be induced. If, now, the single ring be replaced by a special coil, and the magnet be moved as before, the currents induced will be characterized by higher potential, their direction being the same as before.

If, instead of moving the magnet, a piece of soft (unmagnetized) iron be permanently inserted in the spiral, and by rapid contacts with the pole of a magnet be successively magnetized and demagnetized, instantaneous electrical currents will circulate as before. If the poles of a permanent magnet be extended by soft iron rods, surrounded by helices of wire, and the armature be applied, or withdrawn suddenly, currents in these helices will be developed by the resulting change in the locus of maximum magnetic intensity.

Upon these fundamental principles are based all the varieties of magneto-electric apparatus, their differences consisting simply in different mechanical devices for effecting magnetic changes within or near a coil of insulated wire.

If currents of high potential are desired the coils are made of fine wire, while if large quantity is needed coarse wire is used. In either case it must not be forgotten that the *duration* of the current is very short, and that, if a continuous succession of waves approximating to a continuous current be desired, a very rapid succession of contacts and breaks must be provided. The current will then consist of a succession of waves in opposite directions, which, however, by the aid of what is called a commutator, may, if desired, be caused to coincide in direction. Thus modified, magneto-electric currents become very similar in their effects to those obtained from a voltaic battery.

The electricity generated by magneto-electric machines has a lower potential than that given by frictional and voltaic induction apparatus ; indeed, it more nearly resembles, both in potential and in quantity, the voltaic current from many cells coupled in series. It is therefore less liable to escape through defects of insulation in the leading wires than that obtained from the machines already described ; but, on the other hand, it exacts more attention to guard against small breaks in the continuity of the current.

Magneto-electric machines may be classified according to the form in which the force is utilized. Thus, in the progress of invention, instruments were made which acted (1) by a single wave ; (2) by a succession of waves alternating in direction ; (3) by a current more or less unvarying. It may be added, that by the device called a commutator, an alternating current may always be transformed into one pulsating in a single direction, thus transferring the instrument from class (2) to class (3).

The following tabular classification, based on the foregoing analysis, exhibits the magneto-electric igniting machines in most common use :

I. Acting by single electric wave.	Breguet. Jurgensen. Marcus.
II. Acting by a succession of waves alternating in direction.	Wheatstone. Beardslee.
III. Acting by a continuous current.	Class II. with com. added. Gramme.

It may be remarked, in general terms, that Classes I. and II require medium tension, and Class III. low tension fuzes ; but each kind of instrument, as a rule, has peculiarities which render it important to select its fuze with judgment. High tension fuzes can hardly be used with any variety.

In order to convey a fair idea of the relative power and convenience of these several machines for different classes of practical work, the following description of them is added. It will enable the officer to select the one best suited to his needs in any special case. The dimensions refer to sample instruments belonging to the school of Submarine Mining at Willets Point, and are the results of careful measurements. The plates are designed to explain the electrical principles, not the mechanical details of the apparatus.

THE BREGUET MACHINE.

This instrument consists of a horseshoe magnet, the poles of which, prolonged with soft iron, constitute the cores of two induction coils of very fine insulated wire, having a resistance of 9,400 ohms. A soft iron armature in contact with the ends of these cores is attached by a brass plate to a lever extending outside the case. This lever is so pivoted on a horizontal axis that a smart blow will separate the armature suddenly from the poles and thus cause a current, induced by the change in the levers of magnetic polarity, to circulate through the coils. This current is greatly intensified by an extra spark caused by the following ingenious device: The coils are united in series, and the circuit is extended to two terminal posts outside the case; another circuit, forming a shunt between the coils and the terminal posts, consists in part of a spring attached to the lever and moving with it. After moving a certain distance, this spring breaks the shunt circuit, thus producing a strong extra spark by the interruption of the current at its maximum. It is chiefly this spark which passes through the exterior circuit and fires the fuses.

The instrument is encased in a neat box, 18″ by 7″ by 6″ high, the whole weighing 21 lbs. A sliding key blocks the lever when not in use, and thus guards against accidents from careless handling. A switch and five posts on the cover allow any one of five torpedoes to be fired at will.

A tension fuse possessing a decided conductivity, like those of Abel or Von Ebner, is required with this machine; and to effect simultaneous explosions it is well to select fuses nearly alike in this respect. This may be done by noting the deflections of a delicate galvanometer included with the fuse in the circuit of a small battery. Of course, fuses must be coupled in series with this class of machines, but where more than one fuse is used some other class should be selected. Sweden at one time adopted the Breguet apparatus for naval uses, but ultimately decided it to be deficient in quantity—especially for submerged cables, in which electrification largely reduces the volume of the spark. It is stated that on a land line, in 1869, a fuse was fired at a distance of 300 miles by this machine.

It is not easy to establish a standard by which to compare different kinds of igniting apparatus acting by a single wave, for the reason that the instruments differ both in the quantity and the potential of the charge; and the latter element passes from zero through an unknown maximum back to zero in a time immeasurably short. If, however, fuses having a suitable conductivity are to be employed, an approximate idea of the relative power of two machines may be derived from a galvanometer measurement based upon the following principles:

If the currents to be compared be instantaneous, and the needle be so heavy as not to move sensibly during the passage of the waves through the coils, the observed swings of the needle may be regarded as the effect of blows.

In this case the mechanical work is proportional to the versine of the angle of swing (a.), *i. e.*, to $2 \sin^2 \frac{a}{2}$. The electrical work is measured by the product $C^2 R T$, in which C denotes the strength of current, R the resistance of the circuit, and T the time. Hence, for two currents through the same circuit,

$$C_{,} = C_{,,} \frac{\sin \frac{a_{,}}{2} \sqrt{T_{,}}}{\sin \frac{a_{,,}}{2} \sqrt{T_{,}}}$$

Now, if a known wave ($C_{,,}$), of such a nature that the ratio between the square roots of the two times may be assumed to be unity, be sent through a galvanometer, and its swing ($a_{,,}$) be noted, and a like observation be made with the machine to be tested (giving a), this formula will furnish an approximate measure of the power of the latter in known electrical circuits.

This method has been applied to the Breguet apparatus, using for the standard a known condenser charged by a battery of known potential. The latter was 328 volts. Two condensers were employed, the first having a capacity of 1,510 microfarads, and the second 2,344 microfarads. The galvanometer was a fine instrument made by Siemens Brothers, of London, and well suited to this use. The mean results of several measurements, differing but slightly among themselves, were the following:

The first charge (492 microfarads) deflected the needle 6.0 degrees.

The second charge (768 microfarads) deflected the needle 9. 4 degrees.

The Breguet apparatus deflected the needle 17.1 degrees.

Hence, by the equation given above, the charge given by the Breguet machine was:

By first standard: $C_{,} = 492 \times \frac{0.1495}{0.0523} =$ 1,407 microfarads.

By second standard: $C_{,} = 768 \times \frac{0\ 1495}{0.0816} =$ 1,402 microfarads.

This method is not rigidly exact, even in theory, but it is the best which has suggested itself to me; and this remarkable coincidence in two independent measurements indicates that these figures may not be without practical utility in comparing apparatus of this class.

Difference in Time.

USEFUL INFORMAITON FOR TELEGRAPH OPERATORS.

The table appended gives the difference in time between Mexico and other Mexican towns. When it is noon in this city the hour at each place given below is as follows :

	H. M.
Acapulco, Guerrero	11 58
Aguascalientes, Aguascalientes	11 48
Campeche, Campeche	12 34
Ciudad Victoria, Tamaulipas	12 01
Colima, Colima	11 42
Cuautla, Morelos	12 01
Cuernavaca, Morelos	11 59
Culiacan, Sinaloa	11 28
Chihuahua, Chihuahua	11 36
Chilpancingo, Guerrero	11 59
Dolores Hidalgo, Guanajuato	11 55
Durango, Durango	11 38
Guadalajara, Jalisco	11 44
Guanajuato, Guanajuato	11 52
Guaymas, Sonora	11 13
Hermosillo, Sonora	11 13
Jalapa, Veracruz	12 09
Leon, Guanajuato	11 50
Matamoras, Tamaulipas	12 06
Mazatlan, Sinaloa	11 32
Meripa, Yucatan	12 38
Minatitlan, Veracruz	12 18
Monterey, Nuevo Leon	11 58
Morelia, Michoacan	12 53
Oaxaca, Oaxaca	12 10
Orizaba, Veracruz	12 04
Pachuca, Hidalgo	12 01
Paz (La.) B. California	11 16
Puebla, Puebla	12 05
Queretaro, Queretaro	11 56
Saltillo, Coahuila	11 55
San Blas, Jalisco	11 36
San Cristobal, Chiapas	12 26
San Juan Bautista, Tabasco	12 25
San Luis Potosi, San Luis Potosi	11 53
Tampico, Tamaulipas	12 05
Tehuantepec, Oaxaca	12 15
Tepic, Jalisco	11 37
Tetecala, Morelos	11 59
Tlaxcala, Tlaxcala	12 04
Toluca, Mexica	11 58
Tuxpam, Veracruz	12 07
Veracruz, Veracruz	12 12
Yautepec, Morelos	12 00
Zacatecas, Zacatecas	11 47

The Municipal Council of Paris have at last voted a credit for the electric lighting at the principal rooms of the Hotel de Ville.

The stockholders of the Electric, Manufacturing and Miscellaneous Stock Exchange met in the Mills Building last Thursday and adopted a set of by-laws.

George M. Hard, President of the Chatham National Bank, was nominated for President, and Mr. Arthur B. Graves, President of the St. Nicholas Bank, was nominated for Treasurer. The stockholders will meet again on Monday to elect officers. There are now about two hundred members of this Exchange, and $25,000 has been paid into the treasury.

Two electric light towers are soon to be erected in Vera Cruz, Mexico.

An electric light tower seventy feet in height is to be erected in Merida, Mexico.

Electricity on Railways.

BLOCKING APPARATUS — SIGNALLING AND STATION INDICATORS.

Treating of railways naturally brings me to a number of important apparatus used by the Imperial Austrian State railways and invented by the Chief Inspector of Rairoads, Herr Pollitzer. They are :

(1) A central point-blocking apparatus. The object of this apparatus is to control any pointsman from a central office and to prevent him from showing the line clear until ordered to do so by the central office. It consists of a small box and a manipulator. The box has an electric bell at the top and two circular openings in front, exhibiting, in their turn, the two different directions of a train. On the train being announced from the nearest station, the person in charge at the office presses a stud beneath the opening indicating the direction of the train ; the pointsman answers the signal ; the points are now set by the manipulator from the central office, and simultaneously the lever for the semaphore signal is electrically released, enabling the pointsman to show the line clear.

(2) Intermediary blocking apparatus and speed measurer. The apparatus consists of a clock-case, containing a clock-work and sector of a dial, and two glass-covered circular openings above the clock. The train —generally the last carriage—has a small brush attached to a lever, which presses the brush against a brass contact-piece placed on the line, close to the rail, at the beginning of one section. When contact is made, a red disk appears in one of the openings, and the clock begins to move. At the end of the section a similar contact-piece causes another red disk to appear on its respective apparatus, stops the clock movement, and removes the disk of the preceding one. The distance through which the clock-hand has moved over the sector indicates the speed of the train. As long as the red disk is exhibited no train can move in either direction.

(3) Central disk for signalling. On a disk are inscribed different numbers of signals for passenger and goods trains, and a switchboard above the disk exhibits these different numbers on the fall of an annunciator, which is caused by the setting of a contact arm, movable over the disk, on the respective number of the train. All the trains moving on the line are controlled by electric semaphores, which show the line clear only on the appearance of the number of signals characteristic of a special train. As soon as the train has left the section the official at the station turns the contact arm to the place indicated on the disk for that train ; the annunciator of the corresponding numbers on the switchboard falls, and all the semaphores of the section show the line clear.

(4) Apparatus for closing railway gates for foot passengers. The object of the apparatus is the automatic lowering or raising of a gate closing the footpath across a railway line by a mechanism worked electrically. An electric bell, worked by a signalman at some distance from the gate, informs the foot passengers of the approach of the train; and, by the same operation, the gate is closed electrically by the release of a clock train, which moves a jointed lever arm through an angle of 90 degrees ; when the train has passed, the same manipulation opens the gate by completing the movement of the lever arm.

(5.) Station indicator. It is no small boon for passengers traveling by express train over long distances to know the name of the nearest station at which the train stops sufficiently long to take a meal, buy a paper, etc. Herr Pollitzer places in every carriage a small box exhibiting in the corner the name of the next station, with the time allowed for stoppage. The guard has simply to press the stud of a similar box placed in his van some time before the station is reached, and every box shows the name of the next station, with the time allowed for stoppage. The battery for railway intercommunication, which is rarely used, can be employed for this purpose.—*Vienna Correspondence London Times.*

A New Illuminant.

Lieutenant Diek, of the Russian army, is said to have discovered a new illuminating substance which is capable of imparting luminous properties to objects to which it is applied. It is in the form of a powder and of three colors—green, yellow and violet, the latter being the most powerful. Water in a glass vessel is by this means converted into illuminating fluid. In a lecture recently delivered by the inventor at the Nicolai Engineering Academy, at St. Petersburg, he explained the application of the substance to military and industrial mining operations. The illuminating power lasts for eight hours, and the powder must then be renewed. The German government is said to have lately been making experiments with Lieutenant Diek's invention.

Measuring the Intensity of Light.

A new mode of measuring light was proposed at the last meeting of the Royal Society by Mr. Preece, the well-known electrician. The standard of reference is a small surface illuminated to a given intensity, and the mode of comparison is the light given by a small glow lamp, whose state of incandescence is raised or lowered by increasing or diminishing an electric current. The amount of illumination is measured by the amount of current flowing, so that the number of amperes gives the degree of illumination. The standard surface is that illuminated by a British "candle" at 12.7 inches, and this is the same as that produced by the French "bec" at one meter distance. In this way sunlight, moonlight, fog, and the amount of illumination in any part of a room or building, or that distributed over a street or area at any time of day or night, can be measured without any reference to the source of light or its distance from the point light.

Deep-Sea Lighthouses.

A leading English journal indorses a plan recently formed by an English engineer for founding "deep-sea lighthouses" as a hopeful scheme, which, if carried out, will fulfil a want that has long been acknowledged. As explained to the London Society of Engineers, this plan proposes the construction of a hollow cylinder of riveted iron-work, 290 feet long, to consist of two sections—the upper part to be 140 feet long, destined to rear its head above the waves, and fitted as an ordinary lighthouse, while the remaining portion of the tube is to be ballasted so as to sink below the water-line, and counteract the force of the wind and waves on the exposed part. The whole apparatus is to be anchored in deep water by heavy steel cables. The inventor claims that it would be easy to tow such a structure to the spot selected for it, and then, by admitting water to the lower section, it would assume an upright position and ride the waves like a bottle. The practical use which this is intended to serve is to give notice of approaching storms by means of telegraphic connection with the shore. It is believed to be practical to found a floating telegraph station, say one thousand miles from the coast of England, in mid-ocean, from which comings of approaching storms could be given at least twenty-four hours before their arrival.

Electric Light in Hotel Buchtel, Akron, Ohio.

It has been decided to illuminate the three lower floors of Hotel Buchtel with the Brush-Swan incandescent lamp, with the storage battery. One hundred and sixty lamps will be received, which, with the dynamo, will be furnished by the Akron Electric Light and Power Company. The work of putting in the wires for the lamps was begun to-day. The engine which will furnish the power for the laundry, elevator, &c., will be used in running the dynamo.

In connection with this, it may be stated that the electric light company has word of the shipment from Cleveland of another 40-light dynamo for them, which will be put into operation at once, as there are already about orders enough booked to employ its full capacity, with nearly as many more figuring on the introduction of the arc light, with good prospect of their using it.

Too Much Velocity Causes an Electric Motor to Shatter.

Dr. Wellington Adams, of St. Louis, the electric scientist, met with a narrow escape of his life last Tuesday while experimenting with an electric motor, which flew into thousands of pieces, seriously injuring Mr. W. D. McQuesten, formerly connected with the Edison Light Company, but recently engaged in the Wellington Adams Electric Company of this city.

A veil of secrecy surrounding the experimental ventures of the company has prevented the facts from leaking out sooner. A visit was made to the machine shops yesterday. Shafting, belts and wheels that hum med with lightning force a few days since were motionless. The shop was silent. It had a forsaken appearance. Everything about it looked out of place.

Dr. Adams, the inventor, was reading at a work-bench. One of the employes was fitting some delicate brass works together. Another man was running a lathe on the primitive foot-treadle plan. All this was in striking contrast with the busy scene presented when under the influence of an electric current.

"What's the matter ?" asked a *Globe-Democrat* reporter of the celebrated inventive genius, Dr. Adams, "you look dead up here."

"Well, I came pretty near being killed ; that's a fact," said the Doctor, "and Mr. McQuesten was badly hurt. We were experimenting with the three-horse power electric motor that used to run all our machinery here. We had thrown the belt off the motor and were running it with

TREMENDOUS VELOCITY

to test its speed. It was revolving at such a rate that it made the whole building hum from celler to garret. Mr. McQuesten was sitting on top of the motor and I was stooping down with my head close to it, watching its movement, when the whole machine flew into a thousand pieces. Mr. McQuesten's left hand was terribly lacerated and he was thrown across the floor. Parts of the machine flew out of the window and other portions were driven against the wall and into the flooring. All the pieces that went out with force were very small and light, otherwise there would have been considerable damage to the building. Part of the machine, as it went to atoms, grazed my head, giving me such a shock that it was some time before I fully recovered from its effects. I can't tell just how fast the motor was going when the accident happened, for we were not measuring its speed at that moment, but I should say it was making 2,500, and probably 3,000, revolutions per minute.

"Mr. McQuesten's condition is not dangerous, although he is confined to his bed, having contracted fever from his wound. This affair will not interfere with the electric railway we were getting ready for the Fair All that work, with the exception of a few minor details, is practically finished and will be ready for exhibition in ample time. I never heard of an electric motor going to pieces before, and this would not have happened if it had not been run for experimental purposes far beyond all practical use."

The Jarvis Engineering Company of Boston, Mass., have recently closed a contract with the Thomson-Houston Electric Light Company to equip an electric-lighting station in Syracuse, N. Y., of 100 lamps. They will furnish a 100-horse power tubular boiler, set with the Jarvis patent furnace to burn screenings and slack coal, two 9½x12″ Armington & Sims Company's engines to run dynamo-electric machines direct, without shafting, steam-pump, etc., making a complete station. The plant will be laid out so as to allow of its being increased to 400 lights run by eight separate engines.

A New Telescope for Hartford.

ONE OF THE BEST INSTRUMENTS IN THE COUNTRY—ORDERS FOR THE HIGH SCHOOL —A FINE GLASS BY ALVAN CLARK.

(*Special Correspondence.*)

HARTFORD, Conn., Sept. 1883.

The new High-School building in this city, now almost ready for occupancy, will glory in the possession of the only equatorially-mounted telescope in any high-school in America.

An equatorially-mounted telescope is mounted on an axis pointing to the pole of the heavens. In its rotation around that axis it will mark out and follow the apparent diurnal course of a heavenly body in the celestial equator, or great circle of the celestial sphere coincident with the earth's equator.

When the High-School building was burned down a year ago last January $7,000 worth of the finest philosophical apparatus in any high-school in the world was wholly destroyed. They have made a good beginning toward replacing this loss, but it will take a long time yet.

The committee thought that while they were buying a telescope it was just as well to get a good one, and they managed to save enough to pay for it out of the $30,000 appropriated for "furniture and apparatus."

Messrs. Warner & Swazey, of Cleveland, O., have contracted to put in the new instrument for $5,300. They expect to have it ready for use by the end of October. It is to be mounted on the improved steel running-gear, on the same principle as the one made for the Beloit College.

Alvan Clark, of Cambridge, made the 9½″ object glass.

The finder is to be of not less than 6″ aperture, and there are to be six eye-pieces, made by Kohler, giving powers from 40 and 60 to 600. The driving-clock will be governed by a conical pendulum. The hour-circle is 10″ in diameter, graduated to 1 minute, and read by vernier to 5 seconds. The declination circle is 12″ in diameter, graduated to 15 minutes and read by vernier to 1 minute. The hour-circle is to be provided with appliances for setting the telescope on any star without computing its meridian-passage, similar to what is known as the Newton movable hour system. This is to be carried by the main clock.

They are to put up a 17-feet astronomical dome, the running-gear to be the same as has been adopted by the University of Virginia for their 45-feet dome—one of the largest revolving domes in the country. It is to revolve on six triple-conical wheels, each being held with a yoke and guided independently by lateral wheels. These yokes are to be connected together, forming a "line ring" which turns at one-half the velocity of the dome. The shutter is to be 2 feet wide and extend 1 foot beyond the zenith. A lever placed opposite the shutter-opening enables the observer to revolve the dome easily with one hand.

It is guaranteed that it shall revolve on only 15 lbs. pressure. The tube is made of the best No. 22 sheet-steel. The whole is to be mounted on a hollow iron column, carrying the conical pendulum and driving-weights inside.

Alvan Clark is the man who, in testing one of his glasses before it was completed, discovered that there is a companion to Sirius. It is said that he is so careful in his work that even drawing his thumb-nail a few times over the surface of the glass materially alters the result. When he made the large 30″ glass that was taken over to Pulkova, near St. Petersburg, Russia, Prof. Otto Struve, the head of the astronomical department, was so well pleased that he made Mr. Clark a present of an extra $1,000 to show his appreciation. This simply is an illustration of the quality of the work.

Scientific men look a little askance at the way in which the telescope is to be mounted. They are usually put upon a solid stone pillar running down to bed-rock, or at least to a substantial foundation. But the observatory in the new building being directly over one of the main entrances, with a staircase leading to the upper story, of course prevents that being done here. So they have imitated the plan adopted at the Sheffield scientific school in New Haven, which has worked very successfully. The walls of the observatory are 3 feet thick. Three heavy iron bars 15″ thick are fastened to them, and the telescope is set on a 3-ton stone resting on these bars. The base of the stone does not reach the floor of the observatory by some inches, and the builders feel confident that no jarring will be noticeable from any movement in the building.

But Hartford already boasts of a fine telescope which is well known to astronomers in this section of the Union—an equatorially mounted instrument with a $9\frac{4}{10}$″ glass belonging to Mr. Chas. Howard, a scientific young gentleman who first acquired a taste for the study of astronomy in the local high-school. The class is always large and a great deal of interest shown in the subject by the pupils, though but little definite astronomical work is done.

ZACATECAS, Sept. 14, 1883.

Editor Electrical Review:

DEAR SIR: Never heard of Silao? You will, and in the near future, too, for Silao is bad, awful bad! Silao was good, but that was before the Central Railroad decided to make it the terminus of its second division, and the point from which starts the branch to Guanajuato, situated on the main line, 383 kilometers from Mexico City, it has suddenly awakened to its own importance, has its quota of "gin-mills," "gambling-dens" and "dives," all of which are advertised in English that would shame a Mongolian. Nowhere in the Republic is there to be seen the motley but picturesque crowd that continually throng the depot and the spacious grounds thereabouts.

To the left of the depot is seen the tents of the peons who work on the road; here all is life and activity; half-naked women are hard at work grinding maize between two stones, while others are patting the dough vigorously between their hands, after which a heated stone or vessel bakes it, and when finished we have as a result the Mexican tortilla, which, if one don't mind the dirt, is not only appetizing but wholesome, and is the chief diet of the Indians.

On the arrival of the trains the blind and lame, the very old and very young are started out to beg, and from the appearance of the crowd one is led to suppose that a hospital has been destroyed by fire and the inmates without shelter are awaiting the erection of a new building.

Conspicuous, to an extent that makes all others serve the purpose of a frame, is the picture of the American, the "bad man" of the place. He is dressed in a "check jumper," pantaloons in his boots, the legs of the latter jammed down to give them a I-am-a-tough-and-don't-you-forget-it look, a greasy cap, the peak of which shades his right ear, a cigar in one corner of his mouth, which from its appearance serves the purpose of a chew and a smoke; he saunters through the crowd of Mexicans, half-breeds and Indians, who, as they observe his enormous fists hung from a pair of arms swung in a manner to create the impression that he has only to crook them, lunge out and fell an ox, involuntarily move one side and allow him full play for all his actions.

The aforesaid party, not unlike all of his class, is very fond of dancing, and never misses an opportunity to "whirl a Señorita." The old saying "A soft answer turneth away wrath," is full of virtue in Mexico as elsewhere, and the following incident related of the bad man is an evidence of his generalship when in a tight place:

He had enjoyed himself hugely, was looked upon as a dangerous rival, and by those who couldn't catch on to the "Pivat," but unfortunately, after having partaken of too much "aguardiente" he sought to dance with a dusky "Muchacha," who did not like his style, and who on being approached, promptly refused his offer; true to instinct, he replied in terms more forcible than elegant, "Go to ——."

A brother of the girl standing near overheard the remark, his knowledge of English enabled him to appreciate the immediate danger to the family, and having no desire to see any member of it in a climate *mas caliente que este*, he demanded an instant apology.

Everybody expected a "Plaza de Toros" scene, but were happily disappointed, when the bad man, with a sly look at his companions, cooly replied:

"Want an apology, eh! Well, tell your sister I have changed my mind; she needn't go."

Yes, he's bad, but not at heart, and is the railroad man all over the world; always happy, never saves a cent; too generous for that, and is the harbinger of success wherever found, particularly in Mexico. Therefore Silao is sure of a future as are all places honored with the presence of these great promoters of civilization, the railroad, telegraph and telephone.

Only those who have journeyed for six days in a "diligencia," nine inside passengers, with knees interlocked, doomed to ride for 10 hours with but one intermission, over roads whereon a mule oftentimes finds it difficult to walk, one of these roads being so nearly impassable as to deserve the name of *Sal' si puedes*, "Go if you can," can appreciate the worth and convenience of railway communication.

The writer having ascertained that the first train would start from Lagos (the present terminus of the Central Road) for Encarnacion, 48 kilometers north of Lagos, on the day set apart for his return to Zacatecas—he had just finished a tour of inspection covering four States, and would have agreed to ride on the trucks of an engine rather than journey by diligencia—made an ineffectual attempt to see Superindent Knowles, but, of course, was just in time to miss both him and the train, and per force of circumstances must take the "diligencia," but received the glad information that on his next circuit *El Cochero* would probably handle a "flag and lantern" in place of the "ribbons."

The Central Road, but for the drawbacks in the shape of "washouts," would have opened to Aguas Calientes (98 kilometer from Lagos) by September 1, whereas they will now reach that point about October 1, and Zacatecas two months later. In the meantime the Northern Division is coming South at the rate of 2 and 3 kilometers daily, and it is confidently expected that the connecting link between the United States and Mexico will have been joined by July of next year.

At no period in the history of this Republic have the prospects for a rapid accumulation of wealth been so bright as at present, and in common with other good enterprises the telephone is receiving its usual large share of attention.

The Central Company shows an increase of more than fifty new connections for the month of August; is already more than paying its operating expenses, and has yet to occupy some of the most valuable territory in the country, chief among which are the States of *Queretaro* and *Aguas Calientes*, the latter named promises to be the railway center of the Republic, having been selected as the terminus of the new road now building from Tampico, the terminus of the road from Guadalajara, also the location for the machine shops and supply department of the Central Road.

All is life and enthusiasm; houses are going up rapidly, people are pouring in, and with one of the finest climates in the world, possessed of valuable hot springs (from which the city takes its name), coupled with good drainage and lots of room to grow, it is not surprising that the Mexicans are perfectly carried away with a fever of excitement and heartily welcome all.

The following information will be of interest to you and will force the conclusion that, although far from home, we are not wandering aimlessly in a wilderness:

	Offices.	Managers.	No. of subscribers
	Zacatecas	Señor Comercial Jones	50
	San Luis Potosi	Señor F. Tauchon	80
	Leon	Señor H. Gorham	40
	Guanajuato	Señor J. M. Ramos	80
Branches.	Guadalupe	Señorita Chri-tine Flares	10
Branches.	Veta Grande	Señor M. Rodrigue	6
Branches.	Silao	Señor M. Gonzalez	6

The average rentals charged per month is $4.

The writer has received every encouragement from the Governors of the several States hereinbefore named, and such valuable contracts will be obtained from some, if not all of them, within a short time as will make the Central Company one of the most healthy plants in the Republic.

Latest advices from the Puebla Telegraph and Telephone Company denote a steady growth in the subscription list and the extension of trunk lines.

The arrival of the new General Manager—Mr. G. N. Philips, who comes to us with years of experience in the telephone business—will give the interests of the company a new impetus and cause the hearts of stockholders to rejoice. Mr. Philips left the City of Mexico for the scene of his future labors on September 1. He fortified himself strongly with the views of "Judge" Wiley before leaving town, and as the Judge is an acknowledged authority on telephone matters (not to shock his modesty by naming others) we may expect the State of Puebla to "hum" in a short time.

"The Major" La Rue started overland for the States on September 1, and as he journeys East has the good wishes of the many friends he has made while in the Republic. It is no secret that the Major will not return alone, and many are the anxious ones who wait to welcome the Major as a "Benedict."

Mr. C. N. Basdet, who has for the past year been identified with the Puebla Company as manager and acting general manager, will probably assume charge of the Peninsula Telegraph and Telephone Company in a short time. Charlie is one of the pioneers, speaks Spanish like a native, and will be missed in Puebla by all those who admire gentlemanly qualities and a strict attention to business.

Mr. C. H. Dawnham, also of that company, is "off the track," having deluded one of Puebla's citizens into the belief that he has only to plant poles, string wires and die rich, is now earnestly engaged in trying to solve the problems as to the best manner of constructing telephone lines and working them without 'phones and in defiance of any authority from the Government. Charlie is a pretty good boy, but awfully young, and we fear will fall before he flies far.

And right here allow me to say to all ambitious young men, don't come to Mexico expecting to pick up nuggets of gold and silver on every hillside; the best "finds" are discovered far below the surface, and can only be reached by brains and capital. If you have a good thing, plenty of money to back it up, combined with patience, come right along and you will find lots of vacant spaces near the "grab-bag," otherwise you wont get a glimpse of it. W. E. H.

Whiskey Given Years by Electricity.

"Give it a shock."

A young man from Chicago stood before one of the most elegant bars in Cleveland and gave the above order to the bartender, who stood waiting for a citizen to dispose of a drink of pure whisky.

"A what, sah?" asked the chemist leaning over the bar to catch the customer's remark.

"Why, a shock. Haven't you imported an electric machine here yet? They're getting popular out West. It is nothing but a cheap method of purifying whisky. By this process every saloon can have a little machine turned by hand, and every person be personally convinced that his whisky is electrically pure. All that is necessary is to have two blocks of carbon, which are inserted in the liquor to be purified. These carbons are connected with the positive and negative poles of an ordinary electric machine, and are wrapped about with flannel. The chemical action upon the liquor is such that all the impurities are attached thereto. The excess of fusil oil also finds lodgment in the flannel, and when the latter is removed it looks as if it had been steeped in brine. Dealers will no longer need to use the antiquated prevarication that wine has been on a sea voyage. The necessary age can be attached to it by a dynamo-electric machine in a few minutes."

The Great Telegraph Lease.

The Montreal *Shareholder* says that this important suit was before the Court of Appeals during the present week, when judgment was rendered. It has been the subject of comment on several occasions in the *Shareholder*, but, briefly stated, the gist of the matter is as follows: On the 17th of August, 1881, the Montreal Telegraph Company entered into an agreement with the Great Northwestern Telegraph Company to lease all its property and lines for a term of ninety-seven years, the Great Northwestern agreeing to pay the Montreal Company annually the sum of $165,000, or, in other words, to guarantee to the Montreal Company an annual dividend of eight per cent. upon its capital stock. The fact of such a monopoly being created, and of so great an enterprise being taken out of the control of Canadian capitalists, naturally provoked much opposition in certain quarters. Mr. John Low, plaintiff in this case, a shareholder in the company, brought an action to have this agreement annulled and set aside as being beyond the powers of the Montreal Telegraph Company, and praying that the Montreal Telegraph Co. should be ordered and enjoined to retake possession of its lines and property and continue to operate them as before. The Superior Court annulled the agreement, holding it to be an illegal transfer and surrender of the franchise conferred on the company by its act of incorporation. The Montreal Telegraph Company appealed from this judgment to the Court of Appeals, and on Wednesday the latter reversed the judgment of the court below, and maintained the validity of the agreement between the companies. On this decision being made known, some activity was infused into telegraph stock on "the street," and quotations slightly advanced. It is difficult to understand on what basis this new confidence was erected, for when we find that in the dissenting minority of the Court of Appeals are two such eminent jurists as Chief Justice Dorion and Mr. Justice Ramsay, it is needless to say that the legality of the transaction is far from being finally established. In the face of such exalted dissent it has of course been decided to carry the case to the court of last resort. In the midst of the great uncertainty that necessarily prevails as to the final result the late upward movement will seem to many ill considered and likely to be bad for the investors in it.

The Brush Electric Light Company of New England announces a quarterly dividend of 5 per cent., payable October 1.

Telephonic.

Telephony In and About the National Capital.

The Chesapeake and Potomac Telephone Company was organized only a few weeks ago by the consolidation of the companies controlling the District of Columbia and State of Maryland. Under the vigorous management of the new company this valuable territory is being rapidly covered. Exchanges are in operation at Baltimore, Washington, Hagerstown, Frederick, and Cumberland, and new offices are about to be opened at a number of other cities and towns. The apparatus for these new offices is already on the ground, and in a few days they will be in active operation. It is estimated after a careful survey of the territory that it is good for at least 8,000 telephones in the near future. The general manager is Mr. H. B. Lytle, also of the Telephone Dispatch Company, Boston. He has under him an efficient corps of hard-working officials who take a pride in doing good work.

Most of the old Centraloffice apparatus in the exchanges will be displaced by the latest and best. In the Baltimore and Washington offices the multiple board will be placed and no pains spared to give from these exchanges a service second to none in the United States. In the smaller offices throughout the State the Western Electric boards will take the place of the older styles now used. It is proposed to do a ten-second service at these offices.

The construction department will have a thorough overhauling. In Baltimore new lines will be built and wires strung sufficient to accommodate the increase of business that gives promise of coming in. The latest improvements in Central Office roof fixtures will be adopted, and experience having taught some valuable lessons in this direction, advantage will be taken of them wherever it will tend to an improvement in the service.

Very vigorous progress is being made in intertown connections. From the five centers already mentioned, lines are in course of construction which will give communication in almost every direction. The line between Baltimore and Washington, composed of fifty miles of No. 10 iron wire, is working with entire satisfaction, and is pronounced one of the best working lines of similar length anywhere. By making connection at Washington with Alexandria, Va., ten miles more of wire are added, which gives a talking line of sixty miles. In a few weeks Washington will have four routes of communication with Baltimore, each line being several miles apart so that all four of them can be successfully worked at one time.

The people in some sections of this territory are so desirous of having the telephones in their towns, and of connecting with the larger cities, that they have in several instances sent in large written petitions guaranteeing subscribers. Others have volunteered to act as canvassing agents without compensation. These indications are very encouraging to the management and justify them in pushing the work actively.

The Washington Exchange has recently set a splendid pole line through the heart of the city capable of carrying two hundred or more wires. This pole line extends from the extreme western to the extreme eastern end of the city, and is about three miles long. Its shortest pole is sixty-five feet, and the tallest pole in the line is eighty-one feet. There are several eighty feet poles, and the majority of the line is built of seventy-five feet poles.

There are five other trunk lines of poles in the streets and alleys carrying one hundred wires each. During the past year the Washington Exchange has set in the city nearly two hundred poles, and has permits for setting more than one hundred additional which it is about to do. It is generally admitted now that the telephones cannot be worked successfully with underground wires, hence it becomes necessary to set poles. The poles hereafter will be set in alleys.

It is the purpose of general manager Lytle to place the Chesapeake & Potomac Telephone Company abreast of any other for best service, most claims on the public for support, and a progressive and efficient management in every particular.

Texas Telephone News.

A Dallas correspondent says that the telephone exchange in that city is one of the best in the State of Texas, and the first one in the world connecting two cities in different countries. The exchange here is built in the most substantial manner, and has 60 telephones in operation, with an actual income of about $350 per month, with orders for 22 more telephones, which will be put up as soon as received, and which will make the monthly income some $500—a pretty good sum for an outlay of only $11,000.

The line, as it at present stands, has 60 telephones in operation, 138 poles, 312 crossarms, 3,135 pins and insulators, and 59 miles of wire, or nearly one mile to each subscriber. This is occasioned by the fact that each Matamoras subscriber is connected with the central office by his own wire, which is over a mile for each of them. This is occasioned by the refusal of the owner of Santa Cruz to permit the wire to cross directly over the river from the office and proceed by the shortest course to the center of that city, so the wires had to be taken around the curves up to a point opposite Seventh street, Matamoras, and thence run to the center of the town. The river is spanned by 610 feet of 80-wire cable, the largest ever manufactured; and on either bank are commodious and admirably-built cable-boxes or houses, where the shore ends are connected with the land wires. At the central office is one of the best cupolas in the State, which cost $200 to erect, and is of 800-wire capacity, large enough to accommodate all possible needs in the future. The switchboard is of 100 wires capacity and of the latest improved pattern. Another section will shortly have to be added. The line in all, as it now stands, cost some $10,000, of which $2,000 were expended at this point for expenses of construction; this last item includes $700 for freights, and less than $750 for labor. When it is considered that skilled labor is very scarce here and commands its own price, and the difficulties of construction, the company may congratulate itself on having secured its exchange here at very reasonable figures. The material is all of the latest pattern, and first-class in every respect. The poles especially are solid, strong, straight sticks of cedar, which will last for years to come. Mr. Oswald Wilson, the manager, informs us that it is the intention to extend the line and poles to Point Isabel and Brazos, 22 miles away, and that a line will also probably be built to Brulay's sugar plantation, eight miles below town, on the river. The telephone has proved of great convenience to our people, and is daily growing in popular favor.

It is said that a new electrical contrivance has been perfected by Mr. Arthur St George, the inventor of the English telephone which bears his name This invention is really supplemental to the telephone, and will enable every description of conversation carried on through the instrument to be not only recorded but reproduced at any future time. A circular plate of glass is coated with collodion and made sensitive as a photographic plate. This is placed in a dark box, in which is a slit to admit a ray of light. In front of the glass is a telephone diaphragm, which, by its vibrations, opens and closes a small shutter through which a beam of light is constantly passing and imprinting a dark line on the glass. Vibrations of the shutter cause the dark line to vary in thickness according to the tones of the voice. The glass plate is revolved by clock-work, and the conversation as it leaves the telephone is recorded on the sensitive plate, the imprinted words spoken being fixed as is done in photography. The plate can be brought forward afterwards, and when replaced in the machine and connected with a distant telephone will, when set in motion, give back the original conversation.

An Economical Telephone.

In the account of the Vienna Electric Exhibition, given by the correspondent of the London *Times*, the following passage occurs :

A very interesting instrument is exhibited by Mr. Ericsson, of Stockholm ; it is intended for a limited number of subscribers (not more than five), living at some distance from a central station, and replaces a second station, which would necessitate the employment of at least one clerk. By means of this apparatus the correspondence between two of the five subscribers, or between one subscriber and the central office, is effected from the latter. There is one main line between the central station and the, as we may call it, secondary automatic switchboard, which is put up at any place at or near the residence of the five subscribers, and from it a separate short line connects each of the five subscribers with the automatic switchboard. If one of the five subscribers calls, the call is heard only at the central office, where a bell rings and an annunciator falls, exhibiting the number of the calling line. After this the clerk at the central office has to ascertain which of the five subscribers has called, and this being done communication may be established between the caller and any other subscriber of the central station. As long as connection is made neither of the other four bells can ring because the connection is interrupted at the automatic switchboard. As soon as the conversation is finished the clerk at the central office reestablishes the original connections, and the station is ready for a fresh call. A number of these secondary automatic stations can be controlled from one central office, and the saving of conducting wire and also of carbons is considerable.

Telephone Suit Begun in New York.

An important suit has been begun in the United States Circuit for the Southern District of New York, in equity, by the American Bell Telephone Company and others against the Molecular Telephone Company and others, on a motion for a preliminary injunction to restrain the defendants from making and using their instruments, as an infringement of the patents of Alexander Graham Bell. The defendants' answer has just been filed It is quite long and voluminous its principal points being a denial of Bell's claim that he was the original inventor of the speaking telephone, and a denial that the invention as described by him in his claim for a patent, was patentable, on the ground that it was not a useful or practicable invention.

The international exhibition of Nice is to number among its attractions a submarine chamber lighted by electricity and connected with the surface by a telephone. This diving bell will accommodate a number of persons, and as the sea is dark at the depth of seventy meters, the electric light will be used to illuminate the sea bottom to which the chamber will be lowered.

The Lowell telephone managers declared quarterly dividends, as follows, on Tuesday last: Boston and Northern, 3 per cent.; Suburban, 2½ per cent; Bay State, 2¼ per cent.; Union, 1½ per cent.; National Bell of Maine, 1¼ per cent., and Erie, 1¼ per cent. The last named will have a surplus for the quarter, after paying the dividend, of $20,000, estimating the September earnings upon the August basis, which is considered safe. September will probably show a larger increase of earnings for all of the companies than any previous month.

Under date of September 22, the American Bell Telephone Company has issued a circular to the effect that for the convenience of their stockholders, and to facilitate the payment of dividends, the company propose to forward by mail, on each day that dividends are made payable, to each stockholder who may desire it, a check on a Boston bank for the amount of dividend due. The output of the Bell for the month ended September 20 is estimated at about 5,200 instruments—a gain of about 1,000 over 1882.

A suit is being tried in Hamburg, Germany, for libel by telephone. A manufacturer conversed with the manager of his storehouse by telephone, and getting an answer he did not like, he replied in an insulting manner. The man at the other end pretended not to have heard the remark, and asked to have it repeated, letting a colleague receive the second and augmented edition of the insulting remark. In this way he secured a witness and was able to sue his employer for libel.

The six Lowell Telephone companies—National Bell of Maine, Boston and Northern, Bay State, Surburban, Union and Granite State—had 12,676 subscribers September 1, of whom 1,007 were in Lowell. The extra-territorial messages handled in August were 25,783 against 22,231 in July.

The Tropical Telephone Co's sub-company had 76 telephones in operation at Caracas, September 1, and negotiations are in progress for the establishment of an exchange, under local control, at Trinidad The Buenos Ayres company calls for another 100 sets of instruments.

Storm Sounds in a Telephone.

A correspondent of *L'Engenieur Conseil*, signing himself with the initials "E. B.," occupied himself during the violent thunderstorm which occurred at Brussels on June 20 in listening to the storm sounds in the telephone wire. It was, of course, furnished with a good lightning conductor, and, under such circumstances, he is convinced that the experiment was not attended with danger. During the height of the storm there was a continuous noise, which could only be compared to that of frying. From time to time it would grow louder; sometimes there would be a little popping sound, like a bubble bursting; sometimes the series of crackling noises which follow the fall of a drop of grease on a red-hot iron plate. This last noise came abruptly and loud with each flash of lightning, and seemed to precede it. The observer was satisfied that his ear was surprised by the sound before his eye was surprised by the flash. The same noises were often produced when there was no accompanying flash, but then they were less loud. Their force seemed to have no connection with the peals of thunder. On the six hundred lines of telephone wire which focus at Brussels, not one apparatus was damaged by the storm, its effects being altogether expended upon the lightning conductors and storm-warning apparatus. This security may encourage other observers to follow the example of "E. B.," who considers that in this manner it is possible to obtain valuable contributions to the study of atmospheric electricity. He is of the opinion that the constant noise heard in the wires proves the existence in them of a current of atmospheric electricity flowing into the earth, and that a network of telephonic lines overspreading a town would be its best possible protection against lightning.

According to Dr. Van Der Ven's researches, phosphor-bronze in telephone lines has about 30 per cent. of the conducting power of copper; silicon bronze about 70 per cent.; while the steel, as used in wires, has only about 10.5 per cent.

The Department of State has been officially advised that the conference on the subject of electrical units, which met in Paris in October last, and adjourned to meet there in October next, has been postponed to April 2, 1884.

Telegraphic.

On the 20th ult., at the Grand Pacific, the second annual meeting of the Society of the United States Military Telegraph Corps began at ten o'clock, and at the same hotel the Old-Time Telegraphers' Association is in session. The latter body is made up of telegraph operators who have been long in the service, one requirement for admission being that the candidate shall have been an operator at least twenty years, and the prime motive which pervades their organization is a social one; while the first-named organization combines the social element with another one looking toward future recognition for services rendered in the late war. The "Old-Timers," as they are called, have nothing to do with military matters, while the other organization is and has been specially interested in matters military, though the two societies hold their meetings at the same time and place. The prime object of the Military Telegraph Corps, aside from the social one, is that there should be a recognition by Congress of the members who spent so much of their time, ran so many risks in the war, and suffered in many cases by Southern bullets and prison pens, believing that some just reward in some way should be made. As stated in the constitution, the Telegraph Corps was dismissed from the service at the close of the war, in the main, they claim, "unthanked and unhonored."

To agitate this matter, then, is one of the main reasons why this organization has been formed. The meeting was called to order at 10.30 o'clock, with President Plum in the chair. The minutes of the last meeting, held September 21, 1882, at Niagara Falls, were read and approved.

A committee, consisting of Colonel J. C. Van Duzer, W. B. Wilson, and E. Rosewater, was appointed to procure the attendance, if possible, of Generals Grant and Logan, who were in the city. General Grant was not found by the committee, but General Logan was, and made a brief speech. He was heartily welcomed; and after some remarks by the president, stating the object of the meeting, General Logan said that for fidelity and devotion to duty the Military Telegraph Corps of the War of the Rebellion was not surpassed by any corps, and equaled by few. They might rely upon his assistance as far as was proper in obtaining Congressional recogtion. At the conclusion of his brief address there was a short intermission, during which General Logan was presented to most of the members present.

Following this came the address of President Plum, which was in substance as follows:

"There were two purposes which called them together. One was of a social nature, to recall interesting reminiscences, learn of one another's fortunes and misfortunes, extend their hands to living comrades, and sympathize for the dead. Except in the family there was no brotherhood like that which grows on the tented field. There was the wish, too, to revive war memories and renew friendships created in a great and terrible struggle.

There was, however, another reason for their assembling, and that was to consider how they could best present their claims upon Congress for recognition for services in the past. It had taken time to educate a signal corps and to give it a military status. The importance of the telegraph in the war was very great. Bull Run was lost because the telegraph line to General Patterson's quarters in the Shenandoah Valley had not been ordered earlier. The telegraph wires had been right along with the army. It had been officially reported as early as November, 1861, that in many instances the wire followed the march of the army, there being no other lines of communication on the routes where these were placed, and the efficiency of the telegraphic force had been tested."

The President then gave a detailed account of many of the localities during the late war where the telegraph was in close and constant connection with the front and the important part it played.

Over 4,000 miles of military telegraph were in operation early in the war, embracing parts of Pennsylvania, Ohio, Indiana, Illinois, Maryland, Delaware, Virginia, Mississippi, Alabama, Arkansas, Tennessee, Kentucky, Missouri, Kansas, North and South Carolina, Louisiana, and the Indian Territory. The use of the telegraph in advancing military manœuvers and in furthering the cause of the war was beyond calculation. The operators and other employes displayed also much skill, and did much good in tapping the enemy's wires. Many of the operators sickened and died in the service, and the only attention the Government paid to it was to write "discharged" on the pay roll.

THEIR SERVICES RECOGNIZED.

General Burnside, in his campaigns, recognized the value of the telegraph, and gave it words of warm praise; and the great generals of the war felt and appreciated its vast power.

By November, 1863, it became apparent that the Beardslee system of telegraphy was unfit for use, and had done more harm than good. Hence, by order of the Secretary of War, all field telegraphing by wire was given over to Morse operators. The telegraph was of incalculable value to Grant in the Wilderness, to Butler at Bermuda Hundred, to Sherman in Georgia, to Canby at Mobile, to Thomas in Tennessee, and in nearly all great army movements, from the Fall of 1863 to the close of the war. Throughout the war the operators numbered about 1,200. It was a serious question whether 10,000,000 of freemen, defending a country of so many natural barriers, could have been overcome at all but for the co-operation which was made possible by the use of the magnetic telegraph. Gen. Sherman said its value during the war could not be estimated.

During the war 15,000 miles of military lines were built and 6,500,000 telegrams sent at a cost of $2,655,500. Many operators and linemen were killed, others were wounded, and one hundred were taken prisoners; and yet scarcely any general in the army ever noticed the services of the telegraph corps in any report, and American historians were quite as silent. Congress never expressed a lisp about them, and no pension, no bounty, no land privileges, no honors were given. Had Secretary Stanton lived, things might have ended differently, for in his report to Congress he said that the military telegraph had been of inestimable value to the service, and no corps had surpassed, and few had equaled, the telegraph operators in diligence and devotion to their duties. General Franklin, General McClellan, General Warren, General Banks, and General Sherman all bore testimony to the vast value of the telegraphic core in the late war. A cause so strong as was this endeavor to get recognition from Congress could not fail if they persevered.

James Stokes, of Derby Hill, was running a telephone wire a few days ago, when an ox-cart passed, and the wheel caught the wire in such a way as to wind it up on the axle. The wire was made fast to Stokes's arm, and he was pulled down from the pole and had an arm broken. The farmer unwound the wire from the hub and drove on without paying any attention to Stokes, who lay upon the ground.

A telegraph line is to be constructed from La Paz, Lower California, to the central part of that territory.

The Guadalajara telephone office was recently robbed of a large sum of money.

Southern Times Telegraph.

This company has been chartered at Nashville, Tenn. It is authorized to operate in Virginia and West Virginia, Tennessee, Georgia, North and South Carolina, Florida, Alabama, Mississippi and Kentucky.

Telegraph Consolidation.

The Bankers and Merchants' Telegraph Company has taken the building, 187 Broadway, heretofore occupied by the American Rapid. The business of these two companies is to be consolidated with that of the Southern Telegraph Company, under the management of the officers of the Bankers and Merchants'—A. W. Dimmock, president; A. G. Case, treasurer; G. S. Mott, general manager. The line now extends from Boston to Charleston and Cleveland and intermediate points. About 125 of the employes have been discharged. It is expected that the National Telegraph Company will join the combination.

Consolidating Telegraph Work.

A general consolidation of the offices of the Bankers and Merchants', the Southern, and American Rapid Telegraph companies went into effect Oct. 1. The men who own the first-named company will control absolutely the lines of the two other companies, and its principal officers will assume charge of all of the business hitherto attended to by three sets of officers. The Bankers and Merchants' people have leased the entire building, No. 187 Broadway, now occupied by the Rapid Company. It is proposed, under the new arrangement, to discontinue the use of the automatic rapid system, and also to stop issuing telegraph stamps. The working force of the Rapid Company is being reduced, about 140 men having already been dropped. A traffic arrangement has been made between the new combination and the Baltimore and Ohio Telegraph Company, somewhat similar to that which existed between the Baltimore and Ohio and Rapid companies. Mr. J. G. Case, treasurer of the new combination, states that contracts have been made for the construction of about 3,000 miles of new wire. There is some prospect that a union of a mutually satisfactory character will soon be made between the National Telegraph Company, which controls the lines erected along the Nickel Plate and West Shore railroads, and the Bankers and Merchants' combination.

Telegraphing to South America.

VALPARAISO, September 24 (by way of Galveston).—In consequence of the interruption of the Brazilian Submarine Company's cable in the South Atlantic, all the South American traffic will go over the lines of the Central and South American Telegraph Company, by way of Valparaiso and Galveston, which route was opened on Friday last. There will be no change in rates, unless the traffic is so large as to interfere with the speedy and correct transmission of messages.

Underground Wires in Louisville.

MANAGER GIFFORD TELLS WHY IT WOULDN'T BE PRACTICABLE TO PUT TELEPHONE WIRES DOWN AMONG THE SEWERS IN LOUISVILLE.

A reporter met Mr. H. U. Gifford, manager of the Ohio Valley Telephone Company on Saturday last, and asked him what he thought of the underground wire scheme.

"Well," said he, "if a practical plan could be devised which would work successfully and at a cost which would not put telephone rental beyond the reach of our subscribers, we would be in favor of it; but we know of no such plan at present."

"Are not telephone wires laid under ground in some places?"

"Paris is the only city in the world where they have been able to operate underground telephone wires successfully, and this has been accomplished by taking advantage of the splendid system of sewerage peculiar to that city. These sewers are really a system of underground streets, large enough to walk through and provided with a sidewalk on one side. Insulated wires and cables are placed upon fixtures attached to the walls of these sewers."

"Have experiments ever been made in the United States towards operating underground telephone wires?"

"Several experiments have been made, but with the exception of the few short cables put down as experiments, they have proved failures. A little over a year ago the American Bell Telephone Company put down an experimental cable about five miles long at a cost of over $20,000. It was made after the best known pattern and proved a perfect failure."

"Why?"

"First, because the retardation and resistance was so great as nearly to obstruct sound, and, second, because the induction was so great that speaking over one wire at one end of the cable could be heard equally as well over any of the other conductors at the other end of the cable."

"What would be the expense of laying the wires underground?"

"I have not computed the expense, but it would increase the telephone rent to subscribers at least three-fold, making it beyond the reach of the public, and beyond that the telephone could not be made to work over 1,000 feet.

"Could electric light wires be operated underground?"

"I think they could, because they are charged with a powerful current and their use is not affected by induction. The powerful current would overcome the resistance. They would have to be covered, however, with a costly insulation, which would be exceedingly expensive.

"No doubt the companies will fight the ordinance when it is introduced in the Board of Councilmen?"

"I'd rather not say anything about that. I will say this, that if we are compelled to place our wires under ground, Louisville will have no telephone exchange."

"Have you thought of any plan of making improvements in your pole system?"

"We have. Within the last two years a small phosphor-bronze wire has been introduced, and has been found to have sufficient conductivity for lines not over three or four miles long. This wire can be strung much more closely than the iron and steel wire which we have heretofore used. We can put from twenty to twenty-five of these wires in a space now occupied by eight of our present wires. This will condense the bulk of our present routes to one-third their present size. Poles now having ten to twelve cross-arms would then carry but three or four. This would enable us to raise our heaviest routes high enough so as to be entirely out of the way of the ladders of the Fire Department in case of fire. Then, as we approach the exchange and the routes become heavier, we could run these wires into a cable stretched along the poles, a cable three-quarters of an inch in diameter, carrying fifty wires. Four of these cables, for the present, would accommodate any route we have in the city. By adopting these improvements and neatly painting our poles, all reasonable cause for objection would be removed."

American Electricians Honored.

VIENNA, September 27.—Three diplomas have been awarded to American exhibitors in the Electrical Exhibition here.

A female telegraphist of Boston tells the *Globe:* "Women do not make so many mistakes in telegraphing as men do. We've kept an account of that. Men always try to know what the message means; women only try to know what it says. They stick to the text, and they're oftener on the safe side."

The importance of a Government telegraph system has been strongly advocated by many public-men, but it remained for Mr. Frank B. Thurber to discover that the telephone should also belong to the United States.

Fincastle, the county-seat of Botetourt County, Va., is erecting the poles and wires to bring itself in telegraphic communication with the world.

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We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

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The American Institute Fair.

For several weeks past busy preparations have been going forward for the 52d annual fair of the American Institute, which began yesterday in the Institute Building, 3d avenue and 63d street.

The promotors of this exhibition say that it will be exceedingly interesting in the matter of machinery and electrical invention. Among the novelties will be several new gas motors. Eight varieties of steam engines of new types and varieties, it is stated, will be on view. There will also be a machine by which all of the ice used in the building will be manufactured.

The departments are gradually assuming definite form, and pains will be taken to make them as attractive in appearance as possible. Special attention is being paid to the exhibits of house decorating materials and patterns.

Mayor Edson delivered the opening address.

Concerts will be given every afternoon and evening during the exhibition.

Electrical Motors.

We had occasion some time since to make a few mild objections to the mode adopted by an esteemed contemporary of ours (*The Railway Review*) to prove that the locomotive might not be displaced by the electric-motor.

Our contemporary, who seems to have taken this very much to heart, proceeded to demonstrate that the secondary battery and the dynamo could not now nor might either be expected in the future to compete with steam; that neither electrical energy generated by steam, by wind-power or water-power could be regarded, from an economical standpoint, as the equal of coal when applied to motors.

But the unkindest cut of all came when, after quoting a long extract from an address delivered by Sir William Thomson, in which that distinguished electrician decides that the chances of the utilization of tidal energy in the future are exactly even, proceeds to draw the conclusion that "the tides are of but little value."

"Thus," says Prof. Thomson, "we are led up to the interesting economical question whether 40 acres (the agricultural measure approximately for the area of 1,321 ft. square) or 100-horse power are more valuable. The annual cost of 100-horse power night and day for 365 days of the year obtained through steam from coal may be about ten times the rental of 40 acres at £2 or £3 per acre. But the value of land is essentially much more than £2 or £3 per acre in places where 100-horse power could be taken with advantage from coal through steam. Thus the question remains unsolved, with the possibility that in one place the answer may be 100-horse power and in another 40 acres."

Our contemporary forgets that Professor Thomson is talking about England, not about our own country, of which, so far as topographical features are concerned, like his brother Englishmen, he probably doesn't know over much; £2 is about $10 and £3 about $15, or more correctly speaking, $14 52 (Custom-House.) Even $10 an acre per year would be a pretty fair rental for much land in this country bordering the sea, but if Sir William Thomson or even our esteemed contemporary would like to see some land peculiarly adapted for the purposes of storing tidal energy, and which may be *bought* outright for $10 an acre, it would only be necessary to call on some of the old fellows who work "rock" farms on the Massachusetts coast in the neighborhood of Scituate and Marshfield, who would be delighted to get rid of their "ma'sh" for that sum, or might even be induced to rent 40 acres for a whole year for $1 an acre.

Now, we submit that this altogether alters the conditions of the case, and under the very testimony which our contemporary adduces would serve to make the substitution of tidal energy an economical triumph over steam, Q. E. D.

Again, the very fact that our contemporary acknowledges that short lines of electrical railways are a success goes far to supply a base for the assertion we made in our first statement; not, as our contemporary seems to have deluded himself into believing, that electrical locomotion for main lines was already a success, but that there was good reason to believe it would be in the not distant future; an assertion, by the way, which here and now we reaffirm.

But those who believe that electrical energy may be economically transmitted in large quantities hardly look to tidal reservoirs as the best means of its generation. Waterfalls and running streams—not "mining streams" as our contemporary's types make us say—are the most promising agents, and in support of this assertion we will quote the opinion of Prof. C. W. Siemens, of the Royal Society, who our contemporary will have the candor to confess, is no less an authority than Sir William Thomson. In his address before the Glasgow University, when he returned from America, he said:

"I believe the day is not far distant when the power of Niagara will be distributed over the State of New York by electricity." Then he went on to say:

"The amount of water falling over Niagara is equal to 100,000,000 tons an hour, falling 150 feet. The amount of coal required annually to raise such a weight up to the point from which it fell, which is the measure of the amount of power yielded by that water in falling, would require the consumption of 260,000,000 tons of coal a year, which is the amount now consumed by the entire world. Now, if 50 per cent. of the power used to drive the first dynamo-electric machine may be recovered from the second; and hence, if the whole power of Niagara could be utilized, it could be distributed over the United States, so as to give from that waterfall alone a power equal to the present entire mechanical force of the world, estimating that one-half the coal used is solely for mechanical purposes."

As if in corroboration of the opinion of this learned man, M. Deprez, last winter, in the *Chemin de fer du Nord*, in Paris, transmitted six horse-power 20 kilometers, *via* Bourget, and ten horse-power over a line of 35 kilometers, *via* Sevran-Livry; the loss of power, while *in transitu* in both instances, being not much more than 50 per cent. The power here transmitted was collected from the steam engine. Only a few weeks since, however, Deprez made an experiment at Grenoble, France, which goes still further toward the fulfillment of the prophesy of Professor Siemens He placed a series of dynamo machines upon the banks of the River Romanche, the nearest point of which is distant some nine miles from Grenoble. By means of powerful turbine wheels he collected sufficient power to generate the electricity needed to run a manufactory in Grenoble, and light three hundred electric lights besides. This power was transmitted from the banks of the river to the town over a copper wire of two millimeters diameter. The mechanical yield is said to have been about 60 per cent. of the power applied to the first machine, and the utilized force seven horse-power.

Now, in the first instance, where to facilitate operations the power generated from the combustion of coal was employed, we will readily admit the loss of 60 or even 50 per cent. while *in transitu* was a very important item from an economical standpoint. But when power is collected from a huge body of water, where thousands of horse-power are daily running to waste, what would such a loss amount to? That of which there is an inexhaustible supply, and which does not cost anything, may surely be wasted at pleasure.

Therefore, when the apparatus for transmitting such power electrically shall have been perfected, we should like to know how steam, the product of a costly fuel, only 15 per cent. of the theoretical power of which, under the most favorable conditions, may be utilized, can be looked upon as a competitor to electricity, even when used in railway motors?

Sir William Thomson, who seems to be a favorite authority with our contemporary, showed, in his inaugural address last year before the British Association—a year later than the address was delivered from which our contemporary quotes—that if it were desired to transmit 20,250 horse-power by a copper wire half an inch in diameter from Niagara to New York (about three hundred miles), and not to lose more than one-fifth of the whole amount of the work—that is, to deliver up in New York 21,000 horse-power—the electro-motive force between the two wires must be 80,000 volts.

What, it might be asked, is to be done with this enormous electro-motive force at the New York end of the wires? Here is Sir William Thomson's answer: "All that it is necessary to do, in order to subdivide this enormous electro-motive force into what may be called small commercial electro-motive forces, is to keep a battery of 40,000 cells always charged direct from the main current, and to apply a methodical system of removing sets of fifty and placing them on the town supply circuits, while other sets of fifty are being regularly introduced into the main circuit that is being charged. Of course this removal does not mean bodily removal of the cells, but merely disconnecting the wires."

"It is probable," says Prof. Ayrton, commenting upon this, "that this employment of secondary batteries will be of great importance, since it overcomes the last difficulty in the economical electrical transmission of power over long distances. Probably," he continues, "the present storage battery bears as much resemblance to the future accumulator as the bladder which Dr. Clayton used as a gasholder in 1688 does to the gasometer of city gas-works, or as James Watts' crude engine does to the Atlantic steamer."

Thus much for the value of the storage battery. Let us turn again to the motor.

An eminent authority says: "The electro-motor is especially adapted for locomotive purposes, because its construction is simple, its parts are few, and therefore not easily disarranged. It also occupies a smaller space than other motors for its power, except those which are driven by the expansion of a gas stored under an enormous pressure, and which, obviously, are extremely dangerous. Therefore, it bids fair, under certain conditions, to be a formidable rival to steam in the propulsion of railway trains, tram-cars, and other vehicles. With electricity almost any speed could be attained, the limit depending upon air resistance, heated bearings, and friction of machinery. The great advantage of speed, combined with easy control over each vehicle, economy in the cost of rolling stock, and in the space of the permanent way, will, I maintain, render electricity, applied in this way, cheaper and better than our present method, both in first cost and maintenance."

The efficiency of the motor depends upon the speed, load and driving current, and is greatest when the driving current, utilized, equals the back current—that is to say, when the driving current is reduced to half its strength by the resistance of the back current, plus the resistance of the coils of the motor.

In the Portrush Railway electrical energy, generated by steam, has been found more economical than steam directly used in the locomotive. A steam engine at Portrush gives motion to a shunt-wound dynamo of 15,000 Watts. The working speed of this line was restricted by the Board of Trade to ten miles an hour, which was readily obtained, although the gradients of the line were decidedly unfavorable, including a decline of two miles in length at a gradient of 1 in 38.

For the present the power is produced by a steam engine at Portrush, but arrangements are in progress to utilize a waterfall of ample power, near Bush Mills, by means of three turbines of 40-horse-power each, now in course of construction.

With regard to this line, Dr. Edward Hopkinson, who is there superintending the electrical arrangements, writes: "There is now no difficulty in starting the loaded car on the worst part of the hill, which a steam

engine frequently fails to do." On this road there is a long, steep incline—1 in. 38—two miles in length. There was some doubt in my mind whether, with the arrangements adopted, this incline could be worked satisfactorily; it now appears it has been, and that the car is drawn up the incline without difficulty when fully loaded. I may, therefore, say that transmission or propulsion by electricity, even under adverse circumstances, is an accomplished fact. A further six miles of extension to Dervock will connect this railway with the railway system of the North of Ireland; we shall then have a length of twelve miles of line of the same gauge, and using the same carriages as those generally used there.

In closing, we cannot help expressing our regret that we have not been found to coincide with "well-informed railroad men," though why they should be expected to know anything about the subject is likely forever to remain a mystery; and if it is true, as our contemporary would seem to infer, that to differ in opinion with him is to have "a flight of the imagination," we must in candor confess that while reading both his first and last arguments in support of his position, our imagination was continually taking flight.

Important Patent Suits.

NEW YORK.—Important suits have been entered in the United States District Court by A. L. Bogart, of 22 Union Square, against Mitchell, Vance & Co.; Chas. H. Hinds; Smith, Bridge & Co.; The Electric Supply Company, and others. They are suits in equity for infringements of patents held by complainant covering a *frictional electric machine* and *electric gas burners*, used in the lighting of gas jets in multiple, as well as every variety of apparatus and burners now in general use for lighting gas jets singly by electricity. If these patents are held to be valid, it will give the complainant a monopoly of the manufacture of these valuable and popular appliances in the United States.

A Merited Promotion.

Mr. Charles J. Huck, of New Orleans, having been connected with the Louisiana Telephone Company since its inception, as assistant secretary, was appointed, September 1st, as special agent and traveling auditor of the Great Southern Telephone and Telegraph Company.

One of the best authorities on American manufactures, mining, steel, iron, and metal trades is the Chicago *Journal of Commerce*. We know of no weekly paper published in this country that gives so much reliable and comprehensive information on these subjects

At a meeting of the directors of the Erie Telegraph and Telephone Company, held at the office of the company in Lowell, on the 27th ultimo, the statement of the treasurer showed the earnings of the company for the three months ending September 30th, 1883, estimating the months of August and September upon the basis of July, to exceed five per cent. A dividend was therefore declared of one and one quarter per cent., payable to the stockholders on record September 30th, 1883, to be paid by check to be mailed October 25th. The dividend amounts to $60,000, and the company will have a surplus of $20,000. There will be added in the three months over fifteen hundred subscribers, and the increase is at the rate of five hundred per month.

The Bell Telephone Company is now believed to be earning about sixteen per cent. on the stock, while paying twelve per cent. Its experimental line to New York will soon be completed, and the possibilities of long-distance telephoning be demonstrated. Once proven satisfactorily, the telephone will be in position to enlarge the competition with the telegraph.

Electrical Notes.

"'Tis my vocation, Hal; 'tis no sin for a man to labor in his vocation."—*King Henry IV.*

***

It will, no doubt, strike most of those who listened to the reading of Prof. Rowland's paper, before the American Association for the Advancement of Science, or have since read it, that quite as strong an argument might have been made in favor of pure science, without the exhibition of such contempt for those engaged in its application.

***

To say "a mind must be possessed with the elements of vulgarity" which permits itself to rest upon practical work, is to say that all labor is vulgar; and whether such a remark comes from a half-witted idler, or whether it comes from Prof. Rowland, of Baltimore, it is alike silly, snobbish and untrue.

***

If the practical experimenter is contemptible in the eyes of our Baltimore solon, what must be the mechanic, the artisan, the compositor, and the hundred other classes, the members of which earn a living by hand labor?

***

Prof. Rowland should have read his paper before one of the societies of intellectual dudes so common in England, and which I some time since described in this column.

***

This particular description of scientific association is composed for the most part of men who, being possessed of means and nothing to occupy themselves with, seek to pose as patrons of science and the arts.

***

They meet together occasionally, and, after a deafening blare of trumpets, discuss such topics as—Is the oyster a polyp (?) pollination of the prickly pear? Do the South Sea Islanders require rubber boots more than blankets?

***

Then they compliment each other profusely, exchange distinguished considerations, and depart.

***

When, however, one man who is profoundly ignorant on a certain subject attempts to explain it to another who is in the same condition, the result is not apt to be encouraging.

***

But information is not what these men are after.

***

Their names have appeared in the public prints as having contributed a paper, or as having asked the honorable chairman a question, and that is enough for them.

***

It identifies them with the sciences.

***

In England, too, all labor is vulgar; the fact of his being in trade is enough to stigmatize an honest man.

***

When Prof. Rowland essays to show the evils that have been wrought by the inventor and successful experimenter, his folly is most striking.

***

These inventions, he complains, have enabled the man who would have been a vagabond, "without means of subsistence, to become "a little clerk selling tape by the yard, and impudently advising his betters what they should wear."

***

What silly twaddle is this!

***

Is it not a refutation of his very argument that the inventor has worked evil instead of good, if he who would have been a burden upon society is now enabled to earn an honest livelihood?

***

Or is there any disgrace in selling tape by the yard?

Then the learned man goes on to say that whereas, before the advent of his *bete noire*, the inventor, the landscape was as free as nature left, disencumbered as now, with those hideous structures, the factory and the railway bridge.

***

This is really too good!

***

I would inform the Professor that it is even worse than this in the vicinity of New York.

***

Besides the factories and the railway-bridges, the mountain sides and lofty, embattled rocks, formerly so picturesque, have been made the agents for the display of advertisements, pills, potions and pungencies.

***

The argument the Professor made in favor of pure science was well advised and timely, but it would have been as conclusive without a senseless and unreasonable attack on those hard-working men who are devoting themselves toward applying to a practical use those discoveries made by the great men who applied themselves exclusively to abstract questions.

***

But Prof. Rowland should remember that a man struggling with pure science and poverty at the same time may not, in this country, look for a pension, while in England and France the reverse is the case, and, no doubt, this has much to do with the fact stated by Prof. Rowland, that there is little if any work done here in pure science.

***

"Mistrust the Greeks bearing gifts," is an ancient proverb which often finds a significance in these later days.

***

Be never so watchful of the enemy as when he inclines to generosity.

***

Those who have had occasion to visit the vicinity of Irving Place and 15th street after nightfall have had their attention called to a gas-light of unusual brilliancy placed immediately before the door of the Manhattan Gas Light Co.

***

To the casual observer this prodigality on the part of a gas-light company would seem to be almost inexplicable.

***

Surely, he thinks, the times must indeed be out of joint, when a gas company gives anything away!

***

For gas companies which, like their Hebraic prototypes in Chatham street, are wont to look somewhat closely after their "shent per shent," have rarely been accused of wasting unsolicitited favors upon the public, collectively or individually.

***

When the Chatham street clothes-dealer offers a pair of trousers unsually cheap, the would-be purchaser almost involuntarily turns them about, up and down, and looks them over inside and outside.

***

There must be something bogus about them. So it is with a gas company.

***

If your gas bill is less than usual, you instantly suspect that you are being provided with inferior gas.

***

And thus, when a gas company generously gives away a great gas-jet, we involuntarily look for the motive of self-interest which must of a necessity lurk behind the act.

***

Thus we find the present abnormal condition of prodigality into which the Manhattan Gas Light Company has been thrown, to be due to a fear that electric lighting will usurp the place now occupied by gas.

***

It is equivalent to saying to the public: "Look at this triumph of gas lighting! Don't allow yourselves to believe that these miserable little flickering, sputtering dobs of lights on top of the lamp-posts are the best we can do. We can rival the electric light."

***

This is all very well Messrs. Gas Companies, but what do such lights cost? That's what the public is interested in knowing.

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Do such lights cost more than twice as much as electric lights of the same intensity, as we have been informed?

***

If this is the case, you may as well douse them at once, for they are not wanted.

***

For, it is safe to say, that where gas and electric lighting may be had for the same price, the public will invariably choose the electric light.

***

Indeed, recent experience has shown that that portion of the public which has once experienced the advantages of electric lighting will willingly pay more for it.

***

The quasi monopoly so long enjoyed by gas companies has had the inevitable effect of checking progress.

***

The gas being supplied by meter, it has been seemingly to the advantage of the companies to give merely the prescribed illuminating power, and to discourage the invention of improved methods in order that the consumption might reach a maximum.

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The application of gas for heating purposes has not been encouraged, and is still made difficult in consequence of the objectionable practice of reducing the pressure in the mains during daytime to the lowest possible point consistent with prevention of atmospheric indraught.

***

The introduction of the electric light has convinced gas managers and directors that such a policy is no longer tenable, but must give way to one of technical progress.

LaRue-Widner.

WEDDING IN DAYTON WHICH WILL BRING A SHOWER OF CONGRATULATIONS FROM TWO REPUBLICS.

Scores of friends of Major George W. LaRue in this city had no reason to think but that he was busy with the interests of the firm of which he is the representative in the City of Mexico, but it seems that a fair Dayton lady knew otherwise, for yesterday he pleasantly surprised his friends by appearing here. This report of his wedding will explain the whole matter, and an avalanche of congratulations will pour in upon the happy bride and groom from many cities of this country and of Mexico, where the newly-wedded couple have a delightful home awaiting them.

The marriage of Major George W. LaRue, of the City of Mexico, and Miss Carrie M. Widner, daughter of Mr. and Mrs. William Widner, was celebrated at the residence of her parents in this city, at 7 o'clock last evening, Rev A. N. Carson, of Park Presbyterian Church officiating, and the ceremony strictly private.

The groom, who is a member of the firm of Delano, Haines & Co., brokers, promoters, and general commission agents, the principal office being in New York City, with branch offices in Vera Cruz and the City of Mexico, had charge of the construction of the Mutual Union Telegraph lines into Dayton, and was afterwards book-keeper for John W. Stoddard & Co., of this city, and it was during his residence here that the friendship started that so happily culminated in the marriage of Major LaRue and Miss Widner last evening. During his residence here, Major LaRue was one of the most energetic and successful of our gentlemen shooters, and but few if

any in the State could excel him as a wing shot.

The bride and groom left at 8 o'clock last evening for a short visit to Cincinnati, and will return here next week, but not to remain long. From here they will go to New York, Boston, Philadelphia, and Washington, returning to New York, and sail from there for Vera Cruz *via* Havana, about the middle of October. Unless the steamer should be delayed, they will be on the water thirteen days to Vera Cruz; then, with one day's railway ride, reach the City of Mexico.

Major and Mrs. LaRue have a home of their own awaiting them, pleasantly situated on the street nearly opposite the mansion of President Diaz of the Republic of Mexico.

The City of Mexico has a population of 400,000, and the American colony in the city consists of 3,500 people with elegant society circles.

Major LaRue has charge of his firm's business in the city. He, with Gen. Strother, United States Consul General to Mexico, were appointed honorary commissioners to Mexico, as representatives of the Foreign Exhibition now being held in Boston, and his visit to Boston will be in that interest.—*Dayton (Ohio) Journal.*

Boynton-Foster.

On Thursday evening Mr. Fred. J. Boynton, auditor of the New England Telephone Company, at Lowell, Mass., was married to Miss Annie R Foster, of Tewksbury. The wedding was a very brilliant one

A reception to the new couple followed at the house of the bride's mother in Tewksbury, just over the Lowell line. About seven hundred invitations to the church had been issued, and about four hundred and fifty to the house. The parlors were soon filled with guests who poured in their congratulations and went to enjoy themselves at the fine spread prepared by Tufts of Boston, or at the generous display of handsome presents, which contained many notable things, among which were an elegant French clock, from the employes at the executive offices; a very handsome china ice-cream set tastefully decorated, a carving set with pearl handles, and knives and forks to match, from officers of the companies, and others too numerous to mention.

Messrs. Ralph F. Brazer, H. F. Stevens, A. M. Chadwick, C. F. Edwards, G. B. Appleton, Jr., and F. P. Marble were ushers both at the church and at the house. Meanwhile the music of the American Orchestra pervaded the rooms which were everywhere filled with the perfume of flowers. About nine o'clock Mr. and Mrs. Boynton left the house under an auspicious shower of rice, the bride throwing behind her bouquet, which was caught by her fortunate sister.

The couple took the train for Montreal, whence they will continue their honeymoon to Chicago and St. Paul, and back by way of Baltimore and New York—an absence of three or four weeks.

Brownsville Telephone Exchange.

The telephone exchange in this city is one of the best in the State of Texas; the first one in the world connecting two cities, in different countries. The exchange is built in the most substantial manner, and has sixty 'phones in operation, with an actual income of about $350 per month; with orders for twenty-two more 'phones, which will be put up as soon as received, and which will make the monthly income some $500; a pretty good sum for an outlay of only $11,000.

The line, as it at present stands, has 60 'phones in operation, 138 poles, 382 cross-arms, 3,135 pins and insulators, and 59 miles of wire, or nearly one mile to each subscriber. Each Matamoras subscriber is connected with the central office by his own wire, which is over a mile for each of them. This is occasioned by the refusal of the owner of Santa Cruz to permit the wire to cross directly over the river from the office and proceed by the shortest course to the center of that city, so the wires had to be taken around the curve up to a point opposite Seventh st., Matamoras, and thence run to the center of the town. The river is spanned by 610 feet of 80-wire cable, the largest ever manufactured; and on either bank are commodious and admirably built cable boxes or houses, where the shore ends are connected with the land wires.

At the central office is one of the best cupolas in the State, which cost $200 to erect, and is of 800 wire capacity, large enough to accommodate all possible needs in the future. The switch-board is of 100 wire capacity and of the latest improved pattern. Mr. Oswald Wilson, the manager, informs us that it is the intention to extend the line and poles to Point Isabel and Brazos, 22 miles away, and that a line will also probably be built to Brulay's sugar plantation, eight miles below town, on the river. The telephone has proved a great convenience to our people, and is daily growing in popular favor.—*Brownsville, Tex., Cosmopolitan.*

Sleeping with the Head Northwards.

M. G de Rocquigny writes as follows to M. l'Abbé Moigno, editor of *Les Mondes*, on this subject (see *The London Electrician*, September 1, p. 364): "M. C. Vignier wrote as follows in the *Revue Philosophique* for 1882, No. 7, July, p. 31: 'Is there, then, an agency capable of exercising a continuous action on the apparata of the nerves (*canaux*), varying with the positions of the head? To my mind this agency exists, and is none other than terrestrial magnetism. That an all-pervading force should be without any action on our organism when we see it influenced by the least variation of light and heat is surprising enough already. But it is beyond dispute that galvanic currents not only exercise a powerful effect on our nervous system, but that electro-magnets themselves produce well marked effects in certain nervous affections. The experiments undertaken at Salpetrière by M. Charcot leave no room for doubt on this point; and there must be some foundation for the practice adopted by the Swedish peasants, who cause themselves to be buried for several hours so as to lay north and south in order to cure neuralgia.' To this the author adds the note: 'I have this fact from M. Nordstrom, Swedish Consul at Alger. It is, moreover, sufficiently proved by physiological experiments that a very close relation exists between the nervous system and electricity, of which magnetism is but one farm.' In another note the author quotes the following experiment, carried out by M. Ziegler, of which M. Vogt was a witness: 'M. Ziegler takes a lens of soft iron; he exposes it in a place where it will receive the lines of terrestrial magnetism and re-direct them on to the organ to be studied. By thus projecting the magnetic lines concentrated in this manner on the heart of a rabbit, the rhythm of the heart is changed; if the lines are concentrated on the intestine violent peristaltic movements (*péristaltiques*) are caused."—*Journal Officiel*, May 18, 1881.

It has been intimated that an extensive laboratory, to be supplied with the best modern electrical appliances, will soon be erected at the light-house depot at Tompkinsville, S. I., where varied and elaborate tests will be made under the supervision of experienced electricians to ascertain the practicability of introducing electric lights in the Government light-house service.

There are two important tunnels still incomplete on the line of the Northern Pacific—one 3,600 feet long at Boseman Pass in the Belt Mountain, and one 3,850 feet long at Mullan Pass, in the Rocky Mountains proper.

The supply department of the telephone companies, under Lowell management, has been moved to Boston, with large and commodious quarters at 66 Beverly street. Geo. T. Manson has been appointed superintendent.

Telephone Stock Quotations.

American Bell Telephone Company	225
Bay State Telephone Company	123
Central New York Telephone and Telegraph Company	101
Boston and Northern Telephone Company	135
Empire State Telephone and Telegraph Company	203
Granite State Telephone Company	95
Hudson River Telephone and Telegraph Company	110
Long Island and New Jersey Telephone Company	100
Mexican Telephone Company	2½
National Bell Telephone Company of Maine	90
New York and Pennsylvania Telephone Company	100
Northwestern Telephone Company	100
Southwestern Telephone Company	68
Suburban Telephone Company	139
Southern Bell Telephone and Telegraph Company	125
Tropical Telephone Company	3
Central Union Telephone Company	100
Iowa Union " "	100
Missouri and Kansas Telephone Co.	90
United Telephone Company (Kansas and Missouri)	89
Bell Telephone Company, of Missouri	165
Wisconsin Telephone Company	125
Cumberland Telephone Company	100
Great Southern Telephone Company	100
Michigan Telephone Company	115
Chicago Telephone Company	290
Erie Telephone Company	59

NEW PATENTS—ELECTRICAL—1883.

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING SEPTEMBER 25, 1883.

285,445—Electric arc lamp; John B. Tibbits, Hoosic, N. Y.

285,451—Electric lamp; Edward Weston, Newark, N. J., assignor to the Weston Electric Light Company.

285,457—Armature for dynamo-electric machines; Charles F. Brush, Cleveland, Ohio.

285,459—Fire extinguishing system; Charles E. Buell, New Haven, Conn.

285,494—Electrical connection for railway rails; William W. Le Grande, Louisville, Ky., assignor by direct and mesne assignments to the National Electric Railway Signal Company, same place.

285,527—Device for adjusting the brushes of dynamo-electric machines; Charles J. Van Depoele, Chicago, Ill.

285,528—Regulator for electric apparatus; Chas. J. Van Depoele, Chicago, Ill.

285,529—Secondary battery; Chas J. Van Depoele, Chicago, Ill.

285,547—Armature for electric motors; Chas. E. Ball, Philadelphia, Pa.

285,548—Dynamo-electric machine; Chas. E. Ball, Philadelphia, Pa.

285,549—Dynamo-electric machine; Chas. E. Ball Philadelphia, Pa.

285,572—Telethermometer; Chas. L. Clarke, New York, N. Y., assignor to Robert Hewitt, Jr., same place.

285,602—System of electric lighting: Moses G. Farmer, Newport, R. I.

285,670—Duplicate switchboard for telephone exchange; Geo. M. Phelps, Jr., Brooklyn, N. Y., assignor to the Western Electric Company, Chicago, Ill.

285,672—Machine for insulating electric conductors; Herbert O. Phillips, Waterbury, Conn., assignor to Holmes, Booth & Hayden, same place.

285,673—Insulating electrical conductors; Herbert O. Phillips, Waterbury, Conn., assignor to Holmes, Booth & Hayden, same place.

285,676—Electrical thermostat; Fred. H. Prentiss, Boston, and James A. Tilden, Hyde Park, Mass., assignor to the Automatic Fire Alarm Association, Boston, Mass.

285,682—Electric gas-lighting burner; David Rousseau, New York, N. Y.

285,691—Dynamo electric machine; Robert J. Sheehy, New York, N. Y.

285,709—Printing telegraph; Henry Van Hoevenbergh, Elizabeth, N. J., assignor to the Western Union Telegraph Company, New York, N. Y.

285,710—Printing telegraph; Henry Van Hoevenbergh, Elizabeth, N. J.

285,714—Apparatus for charging and discharging secondary batteries; Edwd. Weston, Newark, N. J., assignor to the United States Electric Lighting Company, New York, N. Y.

285,715—Electric arc lamp; Edward Weston, Newark, N. J., assignor to the United States Electric Lighting Company, New York, N. Y.

The Cary telephone signals are being introduced in Lowell.

Manufacturing News.

The woolen and worsted industry in Germany employs about 200,000 persons, that of England and Ireland over 300,000 and the United States about 100,000.

The Cambria Iron Works, Johnstown, Pa., are engaged upon a contract for the United States Government to manufacture steel bombshells of a tensile strength of 90,000 pounds.

Last year Arizona produced over 17,000,000 lbs. of copper. Thus far during the present year the increase has been 38 per cent., and new furnaces are going up. Arizona's output will probably be not less than 25,000,000 lbs. for 1883.

A charter was granted from Harrisburg, Pa., on August 22, to the Philadelphia Traction Company of Philadelphia, Pa., with a capital $5,000,000. The objects of the company are construction of cable motors and other appliances for street railways and furnishing of the same.

The Armington & Sims Company, Providence, R. I., are making two engines 13"x13" to furnish power for six hundred Edison Incandescent lights in the Criterion Theatre, Piccadilly, London, England. They have also received order for six engines 8½"x10" to be shipped at once.

Hussey, Howe & Co., of Pittsburgh, Pa. have ordered a second automatic engine of the Westinghouse Machine Company for use in their rolling mill. It is of 125-horse power. They have in use one of the same size for over a year, which is coupled direct to a 6" three high train of rolls, rolling steel. It makes 340 revolutions, and has been indicated as high as 180-horse power.

In this country in 1882 there were 132,890 net tons of lead produced, worth at an average value of $95 per net ton on the Eastern seaboard $12,624,556. For the first half of 1883 the production is estimated at 70,000 net tons, worth, at $90 per ton, $6,300,000. A very large proportion of the lead-ore, smelted is argentiferous, and is worked for its silver contents, and not for the value of the lead. In the census year ending May 31, 1880, the amount of white lead corroded was reported at 123,477,890 pounds, worth about $8,770,699.

It is now thirty-seven years since first a cotton spindle was set going in Lewiston, Me. The number of spindles has been growing from 10,000 in 1843 to 300,000 in 1883, and from 150 employes to an army of 10,000, to whom $3,000,000 in wages is annually paid. The production of goods in Lewiston the past year has been more than 61,000,000 yards, consuming nearly 30,000,000 pounds of cotton. The production of Lewiston is carried forward about 10 per cent. per year on an average.

The directors are: William H. Kemble, Peter A. Widener, William L. Elkins, Geo. R. Yarrow, George W. Elkins and Geo. D. Widener.

The Northern Pacific Railroad runs for a distance of 6 miles through the famous Dalrymple farm in the Red River Valley, which contains 75,000 acres. The first crop from 1,200 acres was harvested in 1876, and this surface has been added to until now the figure is 30,000 acres. To harvest this crop 200 self-binders are employed, cutting on an average 15 acres per day.

The average yield this season is 20 bushels per acre No. 1 hard, which is under contract for market at $1 per bushel net or above the cost of transportation to market, and it is expected that this year's crop will net $600,000. One self-reaper is required to each 160 acres, and a steam-thresher to each 1,000 acres, and the threshers turn out 1,000 bushels each per day. One of the three owners of this mammoth farm is B. P. Cheney, a director of the road, who is reputed to be the wealthiest man in Boston.

The Manufacturer of Telephones.

It is not strange, nor will it strike with surprise any one familiar with the yearly out-put of telephones when we state that the manufacturer of these instruments is a very busy man.

About sixty-five thousand telephones are made up, adjusted, packed and shipped for local use, an average of about 5,400 a month, or nearly 200 daily of these delicate "speaking machines" are sent broad cast over this continent from one large factory. Mr. Charles Williams, Jr., is the genius who presides over the establishment that accomplishes all this, and to say simply that he is busy tells but half the story. Mr. Williams has the qualities which eminently fit him for this difficult work; being a good organizer, a careful financier, and above all extremely industrious, and, coupled to these qualifications, a genial personality that gives pleasure to those who come in contact with him. It was our good fortune to visit his establishment not long since, and to learn something of the magnitude of the telephone business.

The pleasant office occupies a portion of the second floor of 109 Court street, the remaining four stories, with a floor space of 40x90 each, is used for factory purposes, three stories of the adjoining building, 50x90, and one floor in the rear also 50x90 are likewise devoted to making some parts of the telephone. The total floor space in use is over 32,000 square feet. Besides the telephone Mr. Williams also manufactures magneto bells and annunciators.

Connecticut lies between New York and Massachusetts—the two wickedest States in the Union—and in the natural interchange of rascals between these two great centers of crime they make a sort of highway of Connecticut.

A telephone line is being constructed between Monclova and Salvatierra, Mexico.

It appears from the official report of the New York Produce Exchange that the exports of wheat and flour from the United States for the year ending July 31, 1883, were 146,724,305 bushels against 121,026,922 the previous year.

The Palmer Wire Goods Company of Palmer, Mass., is putting up a new 100x40 feet factory, two stories high, just west of the wire mill. The lower floor is for machinery and the upper for storage and general repairing. The building will be finished by January 1, and will employ from fifty to seventy-five hands.

A factory to manufacture carbons for electric lights will soon be started in Pittsburgh, Pa.

By an imperial decree of the 18th ult. the Government declares lapsed the concession granted to the American Telegraph and Cable Company for landing a submarine cable at Fortaleza, Ceará, and forming a junction with the national telegraph system. Two days after another decree was issued granting the same concession to Henry Cummins, George D. Roberts, and George S. Cox. The terms of the concession require the completion of the cable within two years from the date of the decree.—*Rio News.*

The falls of the Rhine have been illuminated with the electric light by the hotel keepers at Schaffhausen and Neuhausen recently, to increase the attractions for visitors.

BUSINESS NOTICES.

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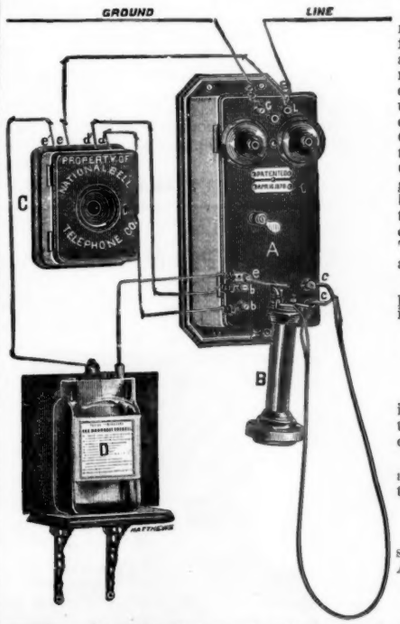

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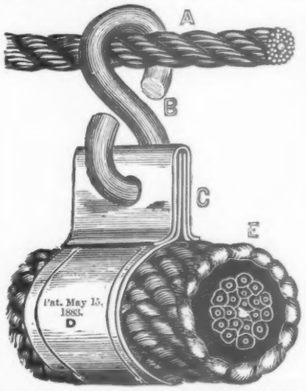

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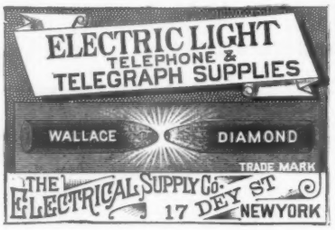

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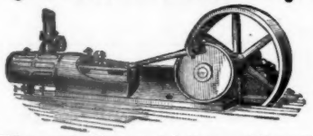

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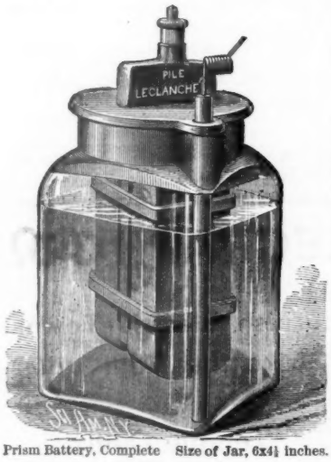

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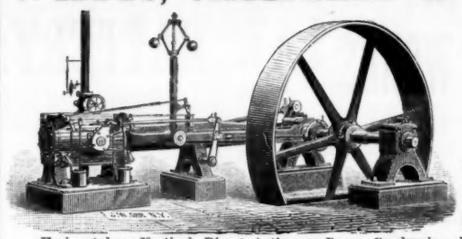

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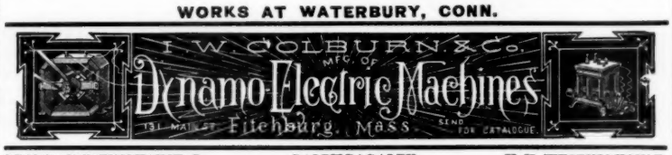

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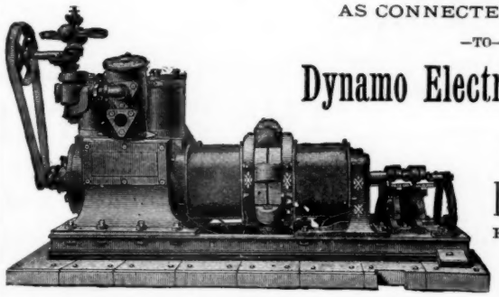

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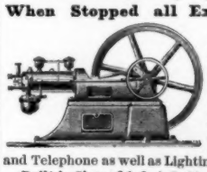

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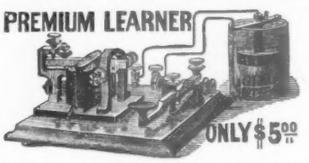

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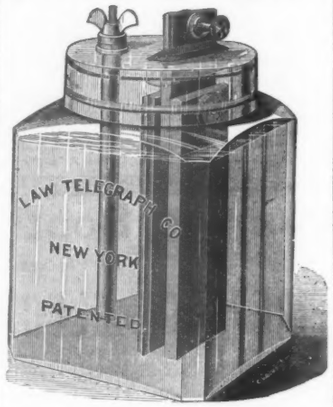

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(*Portland (Me.) Press, September 19, 1883.*)

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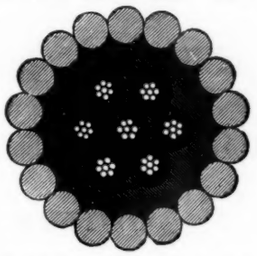

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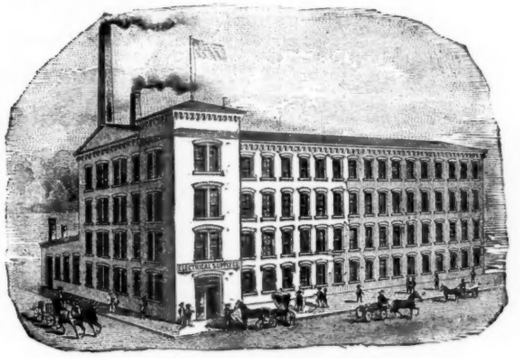

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